

Mobile Solar Water Purifier

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Abstract – Mobile Solar Water Purifier is used to purify water. This equipment is based on the renewable energy source. Solar is a clean energy system which can cut down the pollution problems and gives the opportunity to generate reliable source of potable water. In the absence of solar energy, we are using electricity supply from electric company. This system is specially designed to meet the need of peoples in various regions. Also this system is designed mainly for those regions where electricity rate is high and electricity is rarely available. The system is mounted on the 4 wheel trolley so it is portable from one place to another and because of this we give name for project is as “Mobile Solar Water Purifier”.

As we are using solar energy for getting electrical supply to purify water it is cost free. So customer will not pay electricity bill for purification of water and it is monthly saving of a customer. In this experiment we intend to make a low cost purifier which provide safe drinking water to rural and urban areas.

The “Mobile Solar Water Purification” has a advantage that the purifier is movable from one place to another so it can be used anywhere in absence of electrical supply also.

1. INTRODUCTION

1.1 Problem Definition:

In India, over one lakh people die due to water borne diseases per annually. It is observed that now a days most of the groundwater is unfit for drinking purpose due to excessive concentration of fluoride and ions and also water which is present in environment it is also not fit to drink due to presence of many types of bacteria and chemicals, because in many of company the waste water or waste material is disposed in rivers and other water reservoir. With the increase in the population, the shortage of drinking water is becoming more noticeable. So purified drinking water is need of humans for their healthy health. The technologies present in now days for purification of water are too much costly, these technologies are not affordable to rural areas due it’s cost and availability of electricity because all the present water purifiers works on electric supply.

1.2 Solution and Effect

As clean and purified water is need of humans we can use “Solar Water Purifier” for purification of water. The mobile solar water works on solar energy which is free in nature with no cost. Also solar energy is a clean source of getting energy. In rainy days when solar energy is insufficient or not available we are using electricity from electric company.

1.3 Proposed Work

Now a day’s electricity is a one of the important thing in our life. All the conventional are depleting day by day. So we have to shift from conventional to non-conventional energy resources. In this project combination of energy resource is takes place i.e., solar energy. This process reviles the sustainable energy resources without damaging the nature. In this project we are going to use a purify water using a renewable energy source.

The block diagram for “Mobile Solar Water Purifier” is given in fig (1). In “Mobile Solar Water Purifier” we are using solar panel for getting electrical supply this electrical supply is fed to charge controller which charge battery up to 24 volts. Then supply from battery is given to the diaphragm pump. The input water is given to the pre filter which removes solid dust particles from water then this water is fed to diaphragm pump. The diaphragm pump fed high pressure water to the RO membrane which kill bacteria form the water and we get purified water.

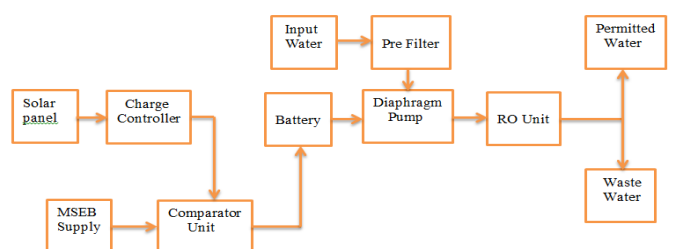


Fig 1.block diagram

2.1 Hardware Implementation

In this project, we are generating the electricity from the solar energy. Based on this generated electricity whole purification process will be run. But in the absence of electricity, we are providing electricity from mains supply. Here we are using comparator to compare solar energy supply, wind energy supply and mains supply. Comparator passes the high voltage supply for the purification process but here we are giving the first reference to the solar energy then wind energy supply or mains supply. The purification process consist of diaphragm pump, RO membrane, activated carbon filter.



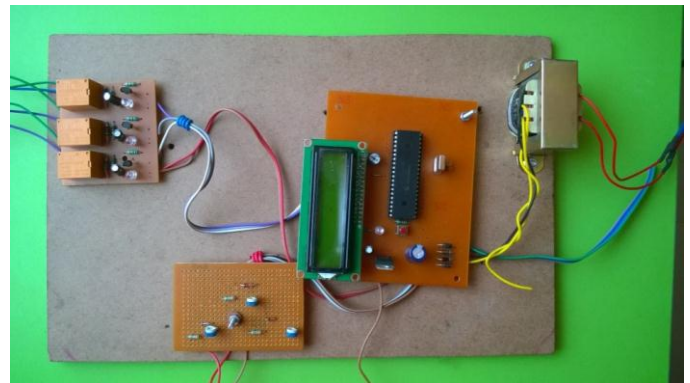
(Fig2. Hardware Model)

The input water feeds to the pre-filter which removes the debris, sand particles and solid particles present in the water. Then this water is passed through RO membrane with high pressure by using diaphragm pump. Diaphragm pump passes the water with high pressure. We have designed the comparator unit based on PIC16F877A 40 pin microcontroller. In low sunshine days, the whole assembly will run on mains supply. The comparator unit compares the solar energy supply and mains supply. And then provides the high voltage supply to the battery. Then battery gives supply to diaphragm pump which feeds water to RO membrane.

2.2 Software Implementation

In rainy season solar energy is not sufficient to charge the battery. Hence we made a programmable output with the help of micro controller. In which solar supply and mains supply is given to relay and by comparing both the supply which one is sufficient to charge the battery is given to battery by using micro controller action. For above process

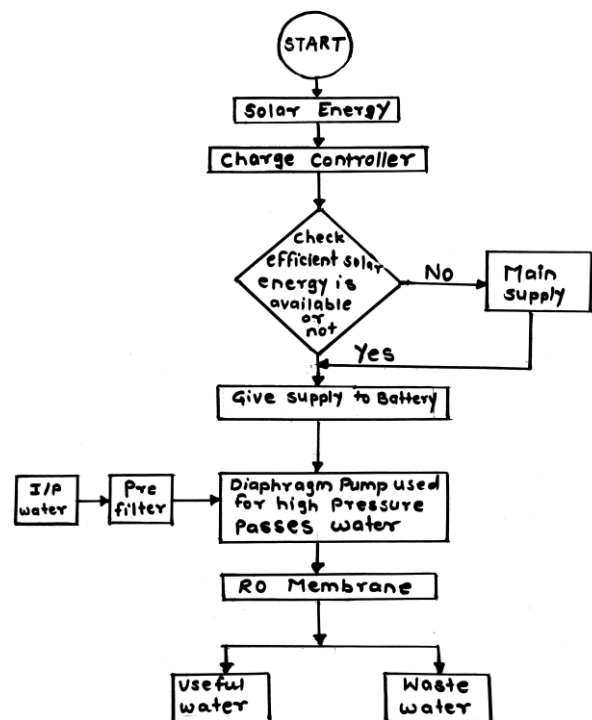
we designed comparator unit. The arrangement of comparator unit is as shown below



(Fig 3. Comparator unit)

In comparator unit the first preference is to Solar energy then mains supply. Also this project run on the supply from wind energy for that we have connection on our comparator unit. Our goal is to purify water with the help of renewable energy sources which will reduce the billing of energy consumed for water purification. The payback period of this project is around 1-1.5 years.

The stepwise procedure and flow chart of project is determined in flow chart given below.



(Fig.4 Flow chart)

2.3 Hardware Result

We performed certain tests on the output water from Mobile Solar Water Purifier and input water for our system. In following table we are mentioned results of these tests here drinking water is our output water from the system

Sr. No	TEST	INPUT WATER	DRINKING WATER
1	TDS measurement	700(ppm)	400(ppm)
2	Hardness measurement	55	20
3	pH measurement	6.5	7.2
4	Turbidity	1(NTU)	0.7(NTU)
5	DO	1.7(ppm)	1.5(ppm)

(Table 1. Hardware results)

Conclusion

So as per our goal off this project, we design a dependable way to purify water for locations those are off grid and don't have constant sources of clean water. This design also fulfill the requirement of low budget product considering the most of the places don't provide potable water to their citizens. Water purification through solar power is one of the best inventions to save energy and to have uncontaminated water. An electric purifier system requires more power and costs a lot more too.

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