

SOLAR BASED WATER PURIFIER FOR RURAL AREAS REAL TIME

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ABSTRACT

About one fifth of people of earth lack the access to safe drinking water. Many countries are facing the problems of water borne diseases such as malaria, typhoid, cholera, diarrhea etc., contaminated water plays significant role in taking numerous lives in rural localities, for which a number of efforts are being made for accessing safe purified drinking water. To overcome these drinking water problems, efficient and cheap water purification system are being utilized and being tried to access worldwide for easy access to clean water.

This system has designed a water purification system to augment the water distribution system. The system utilizes sediment filtration supplemented with ultraviolet light to effectively filter and sterilize contaminated water. The goal of the project was to meet the needs of the long term water treatment solution. The purpose of this report is to present an overview of the entire project including: the design solution, project cost, construction, and maintenance information, testing and evaluation results and future field testing plans.

1. INTRODUCTION

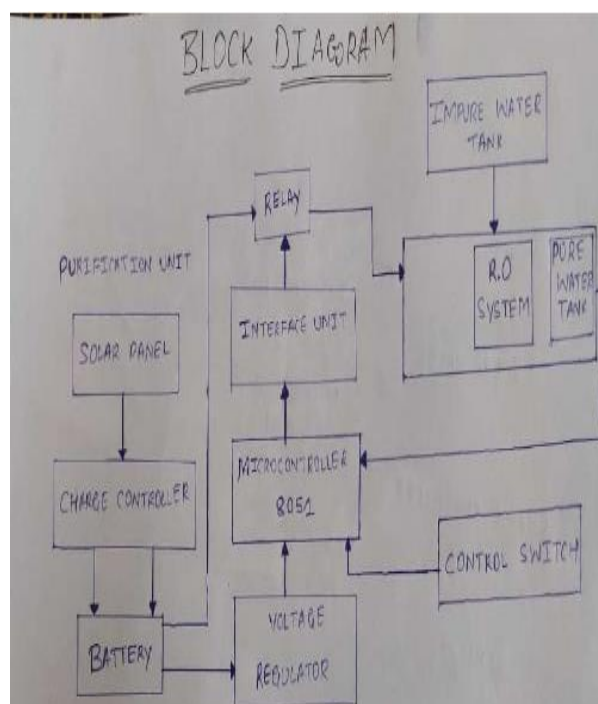
The decreasing availability of water has necessitated in the search for fresh sources of drinking water. The available water in many areas in the country is brackish, saline or impure. Salinity is a major problem in the coastal areas of Kutch and Gujarat. In our country pure drinking water is a major problem in tribal/rural area. There are many processes available for purification of drinking water like Chlorine tablets, Pot chlorination of wells, Slow and rapid sand filters, Fluoride removal, Reverse osmosis plants, etc. In this project, I am making a water purifier which works on solar energy. The basic principle behind this project is reverse osmosis. I am using solar energy which is a renewable source, abundant and cheap. In case of power failures, this purifier will continue to work as solar energy can be stored. Here, I use microcontroller 8051 which prevents the water from over flowing. This purifier can be used in remote and rural areas where there is no electricity. It can also be used in places affected by natural disasters. It also reduces the salt content in sea water. It provides pollution free operation.

2. OBJECTIVES

To remove colour, odour and dissolved solids form the water.

- To make the water purification system user friendly.
- To make water purifier electricity free.

Block Diagram



Working Principle

The solar radiations are collected by solar panel. This energy is then stored in a battery through a charge controller. The charge controller prevents the battery from getting overcharged.

The battery is connected to the purification unit through an electromagnetic relay. The battery is also connected to a voltage regulator. The voltage regulator converts 24V to +5V, which is required by the microcontroller. The purification unit consists of high pressure motor, reverse osmosis system and the water tank.

The high pressure creates the necessary pressure required to carry out reverse osmosis. The microcontroller 8051 keeps impure water tank control switch

microcontroller 8051 interface unit relay battery charge controller high pressure motor solar panel pure water tank r.o system. Voltage regulator issue a watch to the level of water in the water tank and prevents it from over flow. Through this process I obtain the purified water in the water tank.

3. METHODOLOGY

SOLAR ENERGY

Solar energy can be a major source of power. Its potential is 178 billion MW which is about 20,000 times the world's demand. But it cannot be developed on large scale. Sun's energy can be utilized as thermal and photovoltaic. The solar power where sun hits atmosphere is 1017 watts, whereas the solar power on earth's surface is 1016 watts.

The total world-wide power demand of all needs of civilization is 1013 watts. Therefore, the sun gives us 1000 times more power than we need. The energy radiated by the sun on a bright sunny day is approximately 1kw/m², which may be used in driving the prime movers for the purpose of generation of electrical energy. Some applications of solar energy are solar water heater, solar cookers, Solar furnaces, Solar ponds, solar energy collectors, solar energy storage etc.

SOLAR PANEL

In this project, solar energy is being collected by using a solar panel. The collected solar energy is being stored in the battery.

In case of rural and remote areas and the areas affected but natural disasters where electricity is a big problem, this stored energy can be used for the purification of water. The charge controller used here controls the required amount of solar energy to be stored in the battery

REVERSE OSMOSIS

When two solutions of different concentrations are separated by a semi-permeable membrane, solvent (water) flows from a region of lower concentration to higher concentration.

This process is called osmosis. This driving force in this called osmotic pressure. If a hydrostatic pressure in excess of osmotic pressure is applied on the higher concentration side, the solvent flow is reversed i.e., solvent flows from higher concentration to lower concentration. This process is called reverse osmosis. Thus, in the process of reverse osmosis pure water is separated from salt water.

Need Of Purifying The Water

- Helps to keep the environment safe and clean.
- Helps to prevent the various cancer causing risks.
- You can ensure to have great water quality.
- It deeply removes the chlorine from the water and makes it healthy for a drink.
- Once you have the water purifiers at your home you can save money on water expenses. filter water also contributes the air quality.

4. CONCLUSION

As solar energy is being used for the purification of water, which is cheap and abundant, it can be used everywhere where electricity is not available. Here, the microcontroller which is used also prevents the water from overflowing. Moreover, reverse osmosis is a good disinfectant process. This project has only capital cost and almost no running cost. Hence, It will prove to be useful in the near future .

5. APPLICATIONS

There are no moving parts, it is therefore reliable and almost maintenance free. Water taste is claimed to be better since the device act as a solar water vaporizer and it doesn't boil the water. Neutral pH is claimed (like rain water).

6. REFERENCES

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