

SOLAR OPERATED UV WATER FILTER

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ABSTRACT

For a modern and economical country, this project is designed for the water purification system with UV rays and solar panel. An ultraviolet water treated system was build to demonstrate to clean the dirty water. In our country, there three out of four has been affected by water bacterial diseases so, that system is modified for counter this bacterial content. Our only source is solar energy we need only solar power. Two 12v battery has been charged by solar panel. The 12 inch UV Bulb is run on electricity which stored in 24v battery. The UV radiation clean the bacteria and purify water.

Keywords: solar panel, battery, UV bulb, IR sensor, level switch.

INTRODUCTION

Water is the main source of all living beings. All humans required pure water. We have water from either underground or surface water. But that water contain sediments and other soils bacteria. There are many ways to clean or purify water to convert for drinking. In some rural areas there lack of developed water purification system by their poor economic situation. That rural area has no electricity, no communicating system, no source of pure drinking water, and many more. And hence this problems are so important. There are many villages in India, which using lake water or river water which is situated at nearby the area. All daily works like cooking, drinking, cleaning, etc has done by that unpurified water. It is necessary to provide pure water which has less bacteria at low cost with high reliability. It must be important to remove bacteria and kill almost all the bad micro-organisms and reduce the impurities which is located in water. And then water must be stored in safe container to restricted the growth of bacterial water.

Also according to UV World Water Development Report in 2009, it has been estimated that two billion peoples are affected by water shortages in over forty countries, and 1.1 billion do not have sufficient water there is a great and urgent need to supply environmentally sound technology for the provision of drinking water for rural areas.

The objectives are –

1. To provide pure drinking water at low cost to the rural areas.
2. To make the system more energy efficient.
3. To make the system portable and user friendly.

EXPERIMENTAL SET-UP :-

Fig.1 shows the block diagram of system and the experimental set up. The experimental set-up contain a solar panel which has 75 Watt of rating. In this panel there total 36 numbers of cells are available .Open circuit voltage is 21.90 v and Maximum power voltage is 17.96 v. The short circuit current is 4.95 amp and Maximum power current is 4.23 amp. The maximum system voltage is 1000 v. The system is working on two kind of filtrations methods. i.e. Activated carbon filter, which removes the harmful pesticides, parasites and removes the chlorine and improve the aesthetics of the water like colour, bad odors and improves the taste of the water as well. & another one filter is ultra violet ray filter, which destroy illness-causing microorganisms by attacking their genetic core (DNA). It has two 12v separate batteries total (24v) which take input from solar panel and output to system. System has Charge controller or we can say ,charge regulator or battery regulator limits the rate at which electric current is added to or drawn from electric batteries. It has relay also, which can be taking command from level sensor which all controlled by charge controller. It has solenoid valve which can operate a mechanism which regulates the opening of fluid flow in a valve. It has blocking diode type of diode which is use to prevent current flowing back into PV panel. It has level sensor and water tank which can detect the water level and contain in water containing tank.

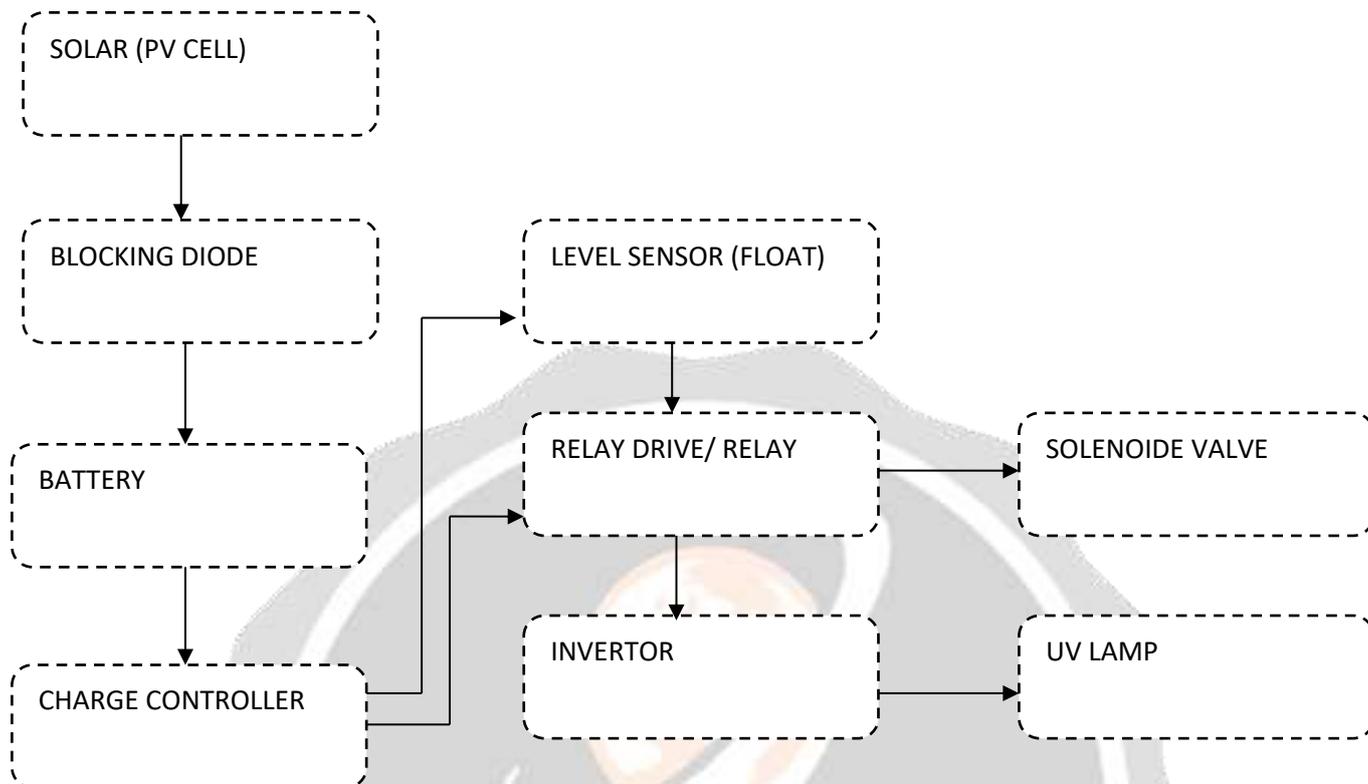
PROCEDURE :-

The set up has placed on a flat surface. Photovoltaic panel along with the set up can be placed separately in the sunlight for battery charging purpose. Water and electrical connections are checked properly for any leakages .The water to be purified should be filled in the top plastic tank. We should take care that as the water starts flowing from the pipe the purging of all the process is done for avoiding air lock. First the impure water passes through the pre carbon filter, this filter effectively removes chlorine sediments and volatile organic compounds from impure water and side by side UV lamp has also in on working condition so by this it can destroy illness-causing microorganisms by attacking their genetic core (DNA).Then water will store in storing container and by the outlet where solenoid valve and IR sensor where attached ,water will used to come out for drink.

WORKING :-

Solar panel which has 75 watt of rating is use to generate the energy to store in batteries at DC form. It acts as a non-conventional source generator. It has total 36 numbers of cell in this panel . For this project we use two 12v batteries i.e. total (24v).Total battery will charge is depending upon the sun rays. Battery has attached in series to operate solenoid valves .There two Regulator IC's which use to charge control and for proper and constant output. There a switch connected in system which is use to on/off the system. In the system, there is a Relay drive which takes input from batteries. Relay is nothing but a Electromagnetic switch which taking command from level sensor which all controlled by charge unit controller. With the help of relay , we can coupled the both control circuit and operating circuit. It coupled logically but it closed physically. Relay has output to solenoid valve which can operate at direct 12v.Also we can use the relay for tripping application. There are two solenoid valves. first is running on by getting the level sensor command and second solenoid valve is running by getting command from IR sensor. so overall the valves is running automatically. The system has L293D kit which is current amplifier IC to amplify the current. By the LDR we get amplify 20mA current which depend upon the source of L293D kit. This LDR kit takes input from batteries and relay and give command to IR sensor. System has inverter that takes input from battery which has 12v of voltage. and convert into AC current form which has 230v voltage. This AC current is use to run UV lamp. UV lamp is use to destroy illness-causing microorganisms by attacking their genetic core (DNA). and as well as there is Activated carbon filter, which removes the harmful pesticides, parasites and removes the chlorine and improve the aesthetics of the water like colour, bad odors and improves the taste of the water. This all process is done in first chamber and then water goes into second storing chamber. At the secondary chamber, solenoid valve is attached which will automatically operates when an object will came in front of IR sensor. Then solenoid valve will be operating and water will came .

BLOCK DIAGRAM



RESULT

it can purify water at low cost and it all working on solar energy. It has some resultant advantages ,which has :-

- ▶ *Effective – Destroys 99.99% of microorganisms*
- ▶ *Chemical free – no harmful chemicals need to be added.*
- ▶ *Quick Process – water flows through the system without need for holding tank or reaction times.*
- ▶ *Low energy usage – low electrical needs*
- ▶ *Taste and odour – Chemical disinfection methods (such as chlorine) change the taste & odour of water and produce by products.*

CONCLUSION

The solar still are eco-friendly to nature and eco-system. Various types and developments in active solar distillation systems. 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 level sensor (float) 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.

FUTURE SCOPE

- ▶ We can increase backup level.
- ▶ Can increase capacity of water tank.
- ▶ It can also use on PLC & SCADA

REFERENCES

- 1) Steven H. Clarke , "Ultraviolet Light Disinfection in the USA of Individual Water Purification Devices" ,*Technical Information Paper # 31-006-0211, January 2011*
- 2) M .Vivar, I . Skryabin, V. Everett, tem"A . concept for a hybrid solar water purification and photovoltaic system" *Solar Energy Materials & Solar Cell 94(2010) 1772-1782.*
- 3) Akshay Acholkar , Mayuresh Kathe , Nimish Kavishwar Mayur Patil , Prof.Deepa Devesagayam "Solar Water Purifier" *Mechanical Engineering Department , F.C.R.I.T Vashi , Navi Mumbai , Maharashtra, India .*
- 4) S.S.Phuse , R.S.Shelke / *International Journal of Engineering Research and Application ISSN: 2248-9622 Vol. 2, Issue 4 July - August 2012, pp. 2014 - 2018 "Water Purification System For Remote Areas Using Photovoltaics.*

