

# Review on Advance Solar Air Cooler (Save Power, Water And Improve Cooling Effect)

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**Abstract**-Energy and water saving mechanism with increase in cooling effect is the reason behind this project, that led to design, develop and build a new solar energy feed air cooler unit with low power consumption. Solar Energy is stored in the battery and used to run the system. In very hot and extreme humid conditions there is need to feel relaxed, cool and comfortable so it has become one of the few needs and for this purpose the use of systems like air coolers and conditioners has increased rapidly. These systems are most of the time not suitable for villages due to long power cutting problems and high cost of products. Solar powered systems are considered as one of the systems having efficient energy. This technology can efficiently serve large loads and greatly improve indoor air quality by providing more ventilation while tightly controlling humidity.

We are going to fabricate the modified cooler for providing the better cooling effect and save some energy and water as compared to conventional cooler. Water pump supply is adjusted in such a way that water can supply in upper tank in regular interval. Upper tank water can come down through pads and copper coil which leads to save water and improve cooling.[1]

**Index terms**- Solar Energy, air cooler, battery, humidity, pads, copper coils.

## INTRODUCTION

Water cooler is a device that cools air through the evaporation of water. Evaporative cooling differs from typical air conditioning system. Which use vapour compression or absorption refrigeration cycle. Solar Energy is stored in the battery and used to run the system. Evaporative cooling works by employing water large enthalpy of vaporization. India is tropical country in which most of the region experience very low temperature during the winter and very high temperature during the summer seasons. That is the

temperature range between summer and winter is very high. Hence, it not very pleasant experience and highly uncomfortable. Through cheaper method of heating are available during the winter season, method of cooling down the hot temperature during the summer do not have a wide variety of option. Air conditioners have high initial and running costs, which cannot be afforded by all the people in a developing country like India. Air coolers are relatively cheap, but provide unsatisfactory results. The project gives the solution of above problems. It is the modification of air cooler. with the help of modifications we have to achieve following goals To increase the cooling effect of the cooler, to save the water to save electricity.

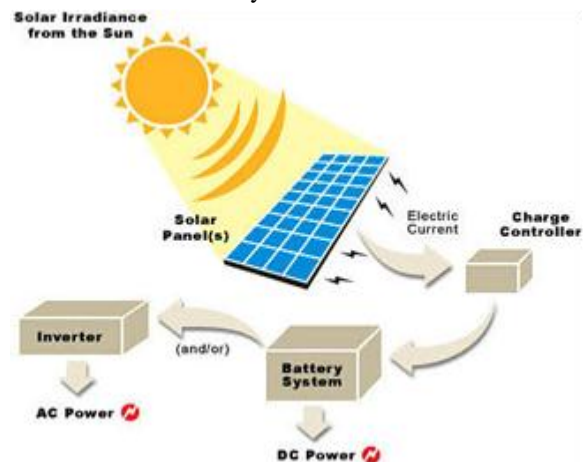


Fig.1: Solar Energy

## LITERATURE REVIEW

Author Vijaykumar Kalwa described in his Modelling and Fabrication of Solar Powered Air Cooler” paper that in hot and humid conditions the need to feel relaxed and comfortable has become one of few needs and for this purpose utilization of

systems like air conditioning and refrigeration has increased rapidly. As solar systems considered as one of the moves towards most sustainable energy systems, considering solar-cooling systems present in villages would comprise of many attractive features. [1]

Author Christopher Baldwin described in his paper on “A review of solar cooling technologies for residential applications in Canada” that in the last two decades, the demand for residential cooling has increased exponentially, creating a significant demand on the electrical grid during the summer months. For the residential as well as commercial applications solar cooling technologies have been developed and implemented. Work conducted under the International Energy Agency is described and a review of cooling installations both worldwide and Canada are discussed. [2]

The paper “Review of International Solar Cooling Incentive Schemes” presents the insights from the incentive review and presents possible approaches to guide the future development of effective standards, guides and rating frameworks. Each country has a range of government incentive and industry development programs, which have been designed with the intention of assisting the renewable energy and building energy efficiency industries. [3]

1 BLOCK DIAGRAM

Solar panel will take input in form of sunlight and convert it into electric energy which will be provided to charging circuit. In absence of sunlight the charging circuit will directly get connected to AC 230V supply. The output of solar panel is regulated to charge DC battery. We also used deep discharge protection which will stop the cooler if the battery level goes below the threshold level. We have used two different regulators since 5V is required by micro-controller and 12V is used by motor.

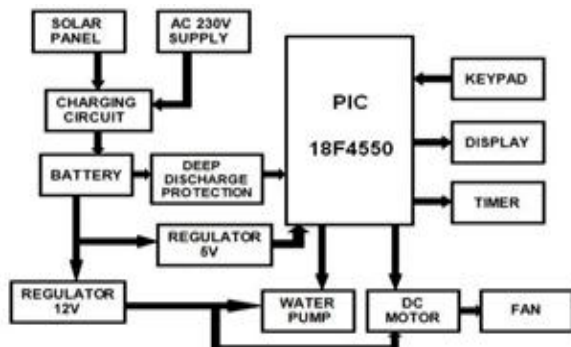


Fig.2: Block Diagram

Sometimes it happens that motor extracts more Voltage than 12V thus the controller doesnt get required 5V and it gets reset. We have used relays to connect pump respectively. We are using the keypad for controlling the speed of cooler and to select the fan and motor and manual or auto mode and one display to show the temperature and the status of the fan speed.

Solar panel used is having maximum voltage and current of maximum power of 40W. DC fan motor operates on 12V and 2A and consumes 24W power. Water pump operates on 12V and 500mA and consumes 6W power. Lithium battery is used which is a rechargeable dc battery having 12V and 7Ah ratings.

2. SOLAR ENERGY CONVECTION

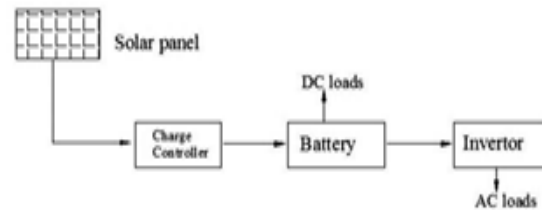


Fig.3: Solar Energy Convection

This mainly consists of two sections. In first section there is solar energy conversion done by using battery and charge controller. The sun rays fall on a solar panel which converts solar energy into electrical energy by photoelectric effect. This electrical energy is stored in battery in the form of chemical energy. A protection circuit is employed in between solar panel and battery which prevents overcharging. Deep discharge protection is used which can enhance battery performance or lifespan. In second section the stored energy can be used for DC loads or else can be converted to AC (alternate current) by the help of inverter. Types of solar energy are UV rays, cosmic energy and visible rays.

3 COOL AIR GENERATIONS BY CENTRIFUGAL FAN

The converted energy is used to run the centrifugal fan. This fan covered with cooling pads, through which water is passed at a specific rate. As the fan sucks the hot air through cooling pads, heat transfer occur between air and water thus generated cool air enters into the room.

4 BATTERY

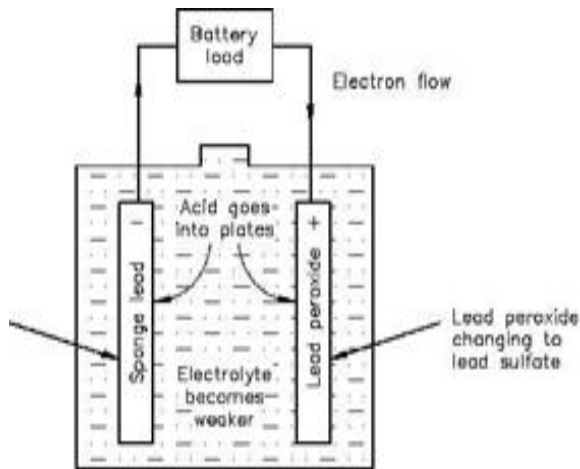


Fig.4: Battery

Despite having a very low energy-to- weight ratio and a low energy to volume ratio, their ability to supply high surge currents means that the cells maintain a relatively large power to weight ratio.

5 BATTERY RATING 12V

Lead acid battery are used which are connected in series. They could deliver 7Amps.(sealed lead acid battery)

6 SOLAR CHARGE CONTROLLERS

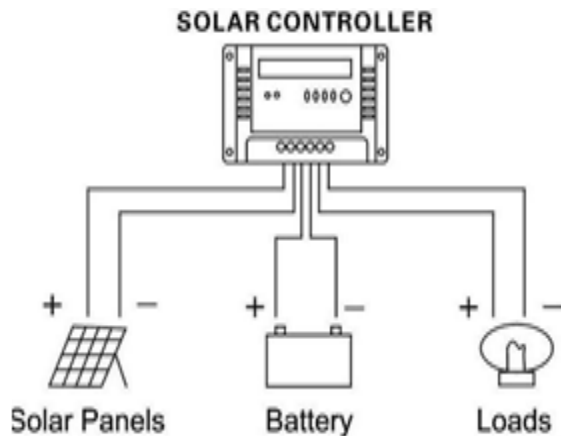


Fig.5: Solar Charge Controller

Most stand-alone solar power systems will need a charge controller. The purpose of this is to ensure that the battery is never overcharged, by diverting power away from it once it is fully charged. Only if a very small solar panel such as a battery saver issued to charge a large battery is it possible to do without a controller.

7 TIMMER CIRCUIT RELAY

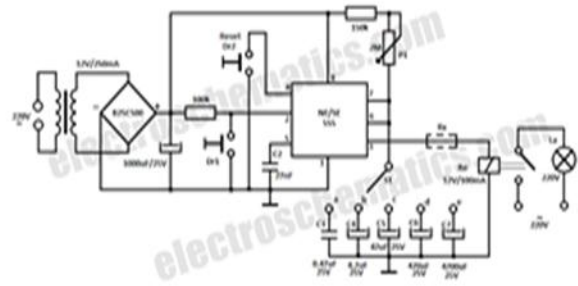


Fig.6: Timmer relay

Hey guys its summer here and temperatures rising as high as 43 degree Celsius. Coolers are out. We have a simple plan in mind for saving energy and water use for coolers. In this air cooler the objective are to save electricity energy, water saving and increase cooling efficiency by providing dc supply 12volt. Timer circuit those function are 1 minute on and 2 minute off. Honeycomb pads are fitted in that Honeycomb pads are long time are wet and attached cooper tube side to Honeycomb pads and direct connection attached to pump.

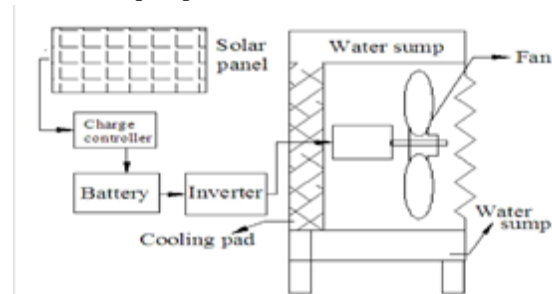


Fig.7 Solar Air Cooler with Cooling Cabin

WORKING

This concept is driven by solar energy. The components involved in this concept are solar panel, battery, charge controller, blower, water pump, timer circuit, copper coil and cooling pads. Solar panel is employed to convert sun light into electrical energy by means of photovoltaic effect. The generated electrical energy is supplied to the battery for storage through charge controller which prevents from power fluctuations. As DC blower is used for cooler, so it can be directly powered from the battery. This blower is surrounded by copper coil and cooling pads through which we can provide continuous water supply. When the blower is switched on, blower absorbs atmospheric air into the cabin through the cooling pads, means at that time heat transfer occur

between water and air, so that cool air enters into the room providing thermal comfort conditions.

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There are two tanks are fitted Top and bottom in between the motor. Around the motor left side, right side and backside are fitted cooling pads. In between the pads copper tube are fitted and water pass from inlet pump through outlet upper tank. Pump is fitted from bottom tank and water supply to upper tank.

COMPONENTS

Sr.No.	Components	Specificstion
1	Solar panel	12V 290x410x25mm
2	Charge controller	12V ,10 amp
3	Battery	12v ,10 amp
4	Cooler	3 feet
5	Timmer realy	12V
6	DC pump	12V ,18Watt 0.50 Amp
7	Cooling pad	Cellulose material

CONCLUSION

We can conclude that this solar product appeals better and affordable by common people. This solar product perfectly suits for villages, schools and offices and thus an alternative to the power cut problems. It comprises of many attractive facilities such as water cooling, variable speed, timer. In addition, the cooler also works on AC mains supply when the solar energy is not available. The cost of generation of power is very less and the source of power is free and available in plenty and there are no power interruptions.

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