

Design and Fabrication Solar Powered Air Cooler

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Abstract: Now-a-days, there is rise in pollution which indirectly results in global warming (rise in environmental temperature) and other environmental problems. In this hot and humid conditions there is a need a to get a fresh and cool surrounding to live comfortably. These needs are satisfied by the air conditioning systems, coolers or the other refrigeration systems. These systems are may work in cities or the infrastructural developed areas. But today due to lack of the available power sources and high costing of the sources there is lot of power cut in these areas and definitely where the developed areas suffer to get power to run the systems, villages or the rural areas also suffers. So solar energy is introduced to solve these crises raised due to lack of available power sources. Solar power systems being considered as one of the path towards more sustainable energy systems. This technology can efficiently serve large latent loads and improves the indoor air quality by controlling the power requirement in low cost and giving efficient working. The energy is stored in the battery and then used to run the mechanism this is the energy and cost saving mechanism.

Keywords: Solar energy, Air cooler, Energy and Cost saving.

1. Introduction

Today, life standards are indirectly related to the amount of energy consumptions. Throughout the history of human beings, the progress is measured by the advances in the in the industrialization which led to the more consumption of available power sources. However, the world today is facing various problems such as lack of energy resources and other atmospheric problems on a major scale which we have never faced earlier. The living comfort can be only achieved at the cost of very vast energy sources. Global warming, the depletion of ozone and escalating cost of fossil fuels are also some important issues for the resources.

The only solution to the problem related to the power sources can be solved by using the natural sources of energy. As a kind of renewable energy source the world is moving towards the availability and more use of solar energy than any other power sources. The solar energy systems can be classified in two categories; (a) those are thermal systems which convert solar energy into thermal energy. (b) photovoltaic systems which convert solar energy to electrical energy. This method may lead to drop of generation of electricity conversion efficiency.

Scientific communities have focused more on using the available renewable sources for housing by reducing the

external energy supply and using the solar energy for the remaining power source. By doing so the solar energy is being used popularly because it increases the independence of use of power source and zero impact on the environment. From the recent studies, those buildings are responsible for the consumption of around 40% of the primary energy consumption and the emission of nearly 33% of the greenhouse gases in the world.

Air conditioning systems are installed in buildings to provide occupants with healthy and productive environment. An air conditioning system consists of components and equipment arranged in sequential order to heat or cool, humidify or dehumidify, purify and clean, attenuate objectionable equipment noise, transport the conditioned outdoor air and recirculate air to the conditioned space and control and maintain an indoor environment optimum energy use.

2. Methodology

The concept of this is driven by solar energy. The above shown model consist of solar panel, battery, inverter, AC blower/fan. Solar panel converts sunlight to electrical energy using photovoltaic effect, this electrical energy is stored into battery which prevents from power fluctuations. As the energy created is in the form of DC. We use inverter for converting DC to AC and blowers starts rotating. These blowers are surrounded by cooling pads with continues supply of water through water pump. This cooling pads create cool air by means heat transfer occurs between water and air. As a result, cool air enters the room providing thermal comfort conditions.

3. Components and Working

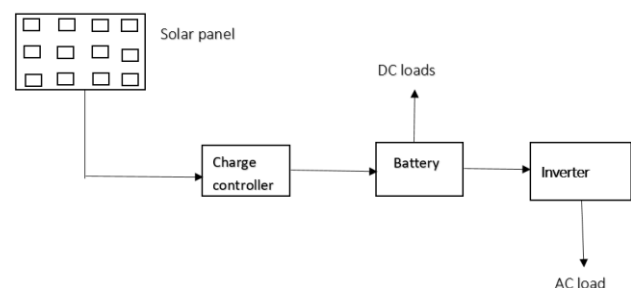


Fig. 1. Solar energy conversion

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A. Solar panel

Solar modules are usually made from string of crystalline silicon solar cells. These cells are made of extremely thin silicon wafers and hence are extremely fragile. To protect the cells from damage, a string of cells is hermetically sealed between a layer of toughened glass and layers of ethyl vinyl acetate. An insulating tedlar sheet is placed beneath the EVA layers to give further protection to the cell string. An outer frame is attached to give strength to the module and to enable easy mounting on structures. A terminal box is attached to the back of a module; here, the two ends (positive and negative) of solar string are welded or soldered to the terminals. This entire assembly constitutes a solar panel.

B. Charge controller

Solar charge controller is an essential element to any solar electric panel system. At a most basic level charge controllers prevent batteries from being overcharged and prevent the batteries from discharging through the solar panel array at night. Charge controllers block reverse current and prevent battery overcharge. Some controllers also prevent battery over discharge, protect from electrical overload, a display battery status the flow of power.

C. Battery

An electrical battery is a combination of one or more electrochemical cells, used to convert stored chemical energy into electrical energy, it consists of a number of voltaic cells; each voltaic cell consists of two half cells connected in series by a conductive electrolyte containing anions and cations. One half cell includes electrolytes and the electrode to which anions (negatively charged ions) migrate, i.e. the anode or negative electrode; the other half cell include electrolyte and the electrode to which cation (positively charged ions) migrate, i.e. the cathode or positive electrode. In the redox reaction that powers the battery, reduction (addition of electron) occurs to cations at the cathode, while oxidation (removal of electron) occurs to anions at the anode. The electrode does not touch each other but electrically connected by the electrolyte. Batteries are the heart of an inverter powered electrical system, storing power for use on demand. The most basic way to draw electrical power from battery is direct current (DC) at the nominal voltage of the battery.

D. Inverter

An inverter is a device that converts battery power (DC) into alternating current (AC) of a higher voltage. Its purpose is to change the direct current (DC) electricity that is generated from a photovoltaic panel into alternating current (AC) that can be used by in home appliances and the community electricity grid.

Because all photovoltaic panels produce electricity in DC, an inverter is required for all solar power system to make the electricity usable.

E. Working

In the first section of these solar energy is converted into electric energy with the help of battery and charge controller. Solar panel catches sunrays and convert them into electric energy using photoelectric effect. Further then this electrical energy is stored in battery in the form of chemical energy. A circuit id provided in between solar panel and battery which provides protection to battery from overcharging. Further then battery provides DC loads which is converted to AC loads with the help of inverter and then it is provided to the air cooler.

4. Results and Discussion

- The machine helps us to save energy as it uses natural energy from sun and does not harm environment in any manner.
- In some areas or villages there is high amount of power cut, in such areas this project will be very useful for them.
- As most of the areas of power cut are in villages and most of the people in villages are not that wealthy so these project becomes affordable ton them.

5. Conclusion

From the above study we can conclude that this solar product provide better and affordable price as compared to existing one by common people. This solar product is very suitable for villages, school, slums, some offices as there is common problem of electrical power cut. This method is ecofriendly, it saves nature and saves electricity. As no electricity is spent on the product so it saves the electricity and environment getting polluted.

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