

DEVELOPMENT OF 100W SOLAR POWER SMART AIR COOLER

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Abstract---These a solar powered smart air cooler is a small portable type of cooler that is used in various rooms of home or office. It is more convenient compared to other types. It serves a number of functions for home owners and office workers such as removal of heat from indoor area. The idea of solar powered cooler has been proven to be very good for Indian country that enjoys an average of 8 hours of sunlight daily. In this research it providing 4 hours of continues operation was powered with just one photo-voltaic (PV) module of 75watts power rating. Also a minimum of 85% efficiency was achieved. In our project Solar Power is captured by solar panel and stored in battery and this power is use to run air cooler when required. This paper shows the work done in designing and fabrication of solar Air Cooler system which is meant specially for creating green environment.Then we have used the battery for storage of collected solar energy. We have used single phase DC motor and this motor is move by battery power. We have provided mobile charging USB port in this cooler.

Keywords: Solar energy, Solar battery, centrifugal fan. Photovoltaic cells, Charge controller, USB charger

I. INTRODUCTION

Human beings give off heat, around an average of 100 kcal per hour per person, due to what is known as „metabolism“. The temperature mechanism within the human body maintains a body temperature of around 36.9 degree C (98.4degree F). But the skin temperature varies according to the surrounding temperature and relative humidity. To dissipate the heat generated by metabolism in order to maintain the body temperature at the normal level, there must be a flow of heat from the skin to the surrounding air. If the surrounding temperature is slightly less than that of the body, there will be steady flow of heat from the skin. But is the surrounding temperature is very low, as on a cold winter day the rate of heat flow from the body will be quite rapid, thus the person feels cold, on the other hand on a hot summer day, the surrounding temperature is higher than that of the body, and so there cannot be flow of heat from the skin to the surroundings, thus the person feels hot. In such a situation water from the body evaporates at the skin surface dissipating water from the body evaporates at the skin surface dissipating

the heat due to metabolism. This helps in maintaining normal body temperature. But if the surrounding air is not only hot but highly humid as well, very little evaporation of water can take place from the skin surface.

Solar energy currently represents the most abundant inexhaustible, non-polluting and free energy resource that could be used economically to supply man’s increasing energy demand (Nassir, 2004). Over the years, there has been a great insight into the renewable energy. As a result there have been great strides trying out many electrical gadgets and equipment as to how they could be powered with renewable energy sources like the solar energy. Solar energy is the energy obtained by capturing heat and light from the Sun. Energy from the Sun is referred to as solar energy. Technology has provided a number of ways to utilize this abundant resource. It is considered a green technology because it does not emit greenhouse gases. Solar energy is abundantly available and has been utilized since long both as electricity and as a source of heat.

By using this solar power energizing the photovoltaic cell and the charge will be store in a cell and by using the cell power the air cooler. We design this cooler system to replace existing costlier and high energy consumption cooling methods and To make aware of non conventional energy sources to reduce environmental pollutions

I. LITERATURE REVIEW

The keywords of the project are solar energy, centrifugal fan, 3D modeling, cooling pad, solar battery. The main objective of the project is to make aware of non conventional energy source to reduce environmental pollution. To provide solution for the power cut problems in villages. The solar panels will works depending upon the silicon cells when sunlight falls on this panel it generates in the voltage signal. Another one main component is PELTIER unit. It is a typical thermo electric module consists of an array of bismuth telluride semiconductor pellets that have been depend so that one type of charge carries either positive or negative mainly of current.

This is a system having a cooling cabin and evaporative air cooler. Room occupant present air cooling methods are evaporative cooler, air conditioning, fans and dehumidifiers.

But running these products need a source called electricity. The working methodology consists of three sections they are solar energy conversion, cool air generation by centrifugal fan cooling cabin for household food items. Air conditioning systems in use are most often built around a vapor compression system driven by grid electricity. However, most ways of generating electricity today as well as refrigerator being used in traditional vapor compression system. 75w solar panel is used and the power is stored in the battery. This power is used to run the air cooler whenever required solar energy means all the energy reaches the earth from the sun. It is based on photovoltaic or solar module which are very reliable and do not require any fuel on serving.

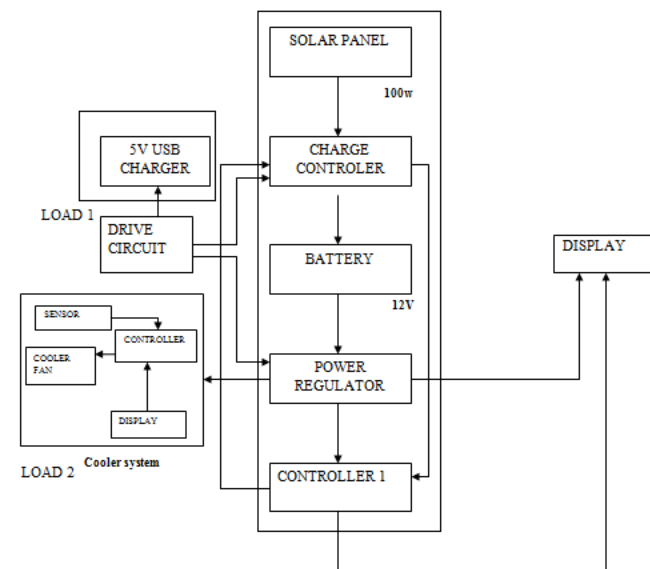
The solar radiation is the generated term for the electromagnetic radiation emitted by the sun. The solar radiation falling on the earth's surface is categorized into ultraviolet radiation, visible light and infrared radiation according to solar spectrum. A solar collector is a device used to collect solar radiation and transfer the energy to a fluid passing in contact with it. Airconditioners a system designed to change the air temperature and humidity in area. It can either be cold or hot. Renewable energy is energy generated from natural sources. The photovoltaic solar panel is photons from sunlight knock electrons into higher state of energy. Battery used in the project is secondary type battery. It is rechargeable type. A battery is one or more chemical cells. Two types of battery primary and secondary. Primary battery is disposable and the secondary battery is rechargeable. Both of them convert chemical energy to electrical energy. A dc pump is used. It is a device used to more gases, liquid or slurries. The fan and pump is controlled separately with help of manual operated switch.

The fundamental of air conditioner design involve the basic principle of physics. The entire frame is made on which every part is mounted. Here we used L type angles and joined them with nut bolts. An ac system is mounted on the frame. The components are compressor, condenser, purifier, expansion valve, evaporator, and cooling fan. At high pressure and temperature, refrigerator in the liquid state. It flows through a restriction. The pressure of refrigerant decreases through the restriction. The refrigerant passes inside a heat exchanger know as evaporator. The heat exchanger has two circuits. Based on the technical details of solar panel it has 12% of typical module efficiency. It consists of screen printed multi – crystalline solar cells. It has efficiency range of 6-30%. It has a typical power of 120w/mm². Solar electricity is the technology of converting sunlight into electricity. It is based on photovoltaic or solar cell. Solar cell work on the principle of photo voltaic principle. The photovoltaic solar energy conversion is one of the most attractive non conventional energy sources. Cells are connected in parallel to achieve the desired voltage. Operating voltage of photovoltaic cell is 0.45v at normal temperature and current 0.270a/m. To get a voltage of 0 to 36V we require 72 cells so we connected 73

cells in series to required voltage. Batteries are used for convert solar energy to electrical energy.

The major component of the solar powered standing fan consists of the following: solar panel, blade case, electric motor, fan blade, control unit, connecting wire and battery. The design of solar powered standing fan consists of blade, shaft, electric motor, PV panel and battery. The shaft power not measured but electric power dropped to 13 percent. Electric power is not expected to drop quite as much as shaft power because motor efficiency is reduced at very low loads. The paper discuss about the construction of hybrid solar cooler. The photovoltaic module may be connected either in parallel or series power converter and batteries are used. Two sensors are used for minimizing the wastage of water as well as in off season we utilise the energy in the form of light. The AC to DC converter with convert the AC voltage in DC voltage. Solar panel charged with battery in day time. Microcontroller circuit will work on power supply as on battery, which will move the solar panel through gas based moving mechanism. Metallic transistor are used to switch or the relay. A relay is an electrically operated switch, it is a single pole double throw switch

II. METHODOLOGY



SOLAR: Here we use photovoltaic solar panel. Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV) module is a packaged, connected assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and

supplies solar electricity in commercial and residential applications.

A. CHARGE CONTROLLER

A solar charge controller manages the power going into the battery bank from the solar array. It ensures that the deep cycle batteries are not overcharged during the day and that the power doesn't run backwards to the solar panels overnight and drains the batteries. Some charge controllers are available with additional capabilities, like lighting and load control, but managing the power is its primary job

B. BATTERY

A container consisting of one or more cells, in which chemical energy is converted into electricity and used as a source of power.

C. POWER REGULATOR

A power regulator is a system designed to automatically maintain a constant voltage level. A voltage regulator may use a simple feed forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

D. CONTROLLER

It is the main controller used here it control the voltage and it gives the signals to the display to displaying different process while doing.

E. DRIVE CIRCUIT

In electronics, a driver is an electrical circuit or other electronic component used to control another circuit or component, such as a high power transistor, liquid crystal display (LCD), and numerous others. They are usually used to regulate current flowing through a circuit or to control other factors such as other components, some devices in the circuit.

F. LOAD 1&2

Here load 1 consists of a 5v mobile charging USB port. Which provide 5v,2-3A to fast charging the mobile. loa 2 included the cooler setup

G. BATTERY LEVEL CIRCUIT

It show the battery percentage in display. It sends the signals to the controller then the controller give the signal to the LCD display. It helps to know about battery drain

H. DISPLAY

LCD (liquid crystal display) is the technology used for displays. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than National Conference on Advanced Trends in Engineering
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cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it.

III. RESULT AND DISCUSSION

The output of the project is Comfort thermal conditions achieved in the living room. That is room temperature up to 25°C and relative humidity of 60%.and we can even charge our cell phones with the help of mobile charger circuit used in the system.

IV. CONCLUSION

By completing this project we have achieved a clear knowledge of comfort cooling system for human by using nonconventional energy. This project would be fruitful in both domestic & industrial backgrounds. We also know about non conventional energy sources and utilization. This project although fulfilling our requirement has further scope for improvements. Some of the improvements that could be made in this solar air cooler with auto tracking unit.

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