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Solar Air Cooler

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ABSTRACT :

In this project we will design and develop a solar operated air cooler that can work with and without battery storage. This air cooler will be fully solar operated and save energy in air conditioning for homes and offices. Our system will be designed for a 12*12 foot room cooling purpose and 100 watts of solar panel will be used. Project hardware will include some important mechanisms such as centrifugal air fan, Cooling Mesh, Water circulation pump, Water Filter with tank, Temperature and humidity display etc. in demonstration room will be cooled using solar energy and in case of solar energy not available battery backup will be used. This battery will be charged using solar only. System will be installed with onboard temperature and humidity display

Keyword:- Solar, Battery Storage, Filter

Introduction :

Nowadays air cooler is available in market. In our project, solar power is stored in a battery. This power is used to run the air collar whenever we required. Solar energy means all the energy that reaches the earth from the sun. It provides daylight makes the earth hot and is the source of energy for plants to grow. Solar energy is also put to two types of use to help our lives directly solar heating and solar electricity. Solar electricity is the technology of converting sunlight directly in to electricity. It is based on photovoltaic or solar modules, which are very reliable and do not require any fuel or servicing. Solar electric systems are suitable for plenty of sun and are ideal when there is no main electricity. Our objective is to design and develop a solar system normally "solar air cooler".

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, and so the person feels hot and uncomfortable

Survey and Specification :

I. The present air cooling methods are evaporative coolers, air conditioning, fans and dehumidifiers. But running these products need a source called electricity. The producing of electricity is ultimately responsible for hot and humid conditions i.e. global warming. 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. These systems are most of the time not suitable for villages due to longer power cut durations and high cost of products. 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

II. air-conditioning and refrigeration has increased rapidly. These systems are most of the time not suitable for villages due to longer power cut durations and high cost of products. Solar power systems being considered as one of the path towards more sustainable energy systems, considering solar-cooling systems in villages would comprise of many attractive features.

III. Air-conditioning is one of the major consumers of electrical energy in many parts of the world and causes energy shortage. However, most ways of generating the electricity today, as well as the refrigerants being used in traditional vapor compression systems, have negative impact on the environment 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. The demand can be expected to increase because of changing working times, increased comfort expectations and global warming.

Discussion and Methodology :

Solar energy will be used to power the pumps and motor used for air flow and water flow applications. Also, this energy will be stored in lead acid battery. Battery storage will be used only if sunlight is not available. Temperature and humidity will be monitored using onboard display. Water will be continuously sprayed over the cooling mesh made of wood fiber and axial fan will blow the air through it this creates a chilling action of air without compressor and takes less energy to cool the room. The fabrication of the machine involves cutting and joining of the various structural components that forms the main supporting structure of the machine, these component are wood and plastics. The main supporting structure holds all other parts of the machine in place both the major and the minor parts including the outer casing of the machine. The frames are cut into the required sizes and are joined together by gum, Water Circulation Pump 12V, 8Amp Lead Acid Battery Solar PV Panel 12v, 100 Watt Fan with Motor Coolig Jacket Wood Fiber Water Tank 1 L Inline Water Filter Temperature Humidity Switch XIII screws and temporary joints considering the ease of maintenance so that the components
can be loosed and fixed again with ease. The prime movers of the machine are fixed on the main supporting structure to hold it in place and to bear the force generated by the electric motors, the blade and slider are bolted in place, the electrical components are connected and fitted inside the case of the structure Manufacturing cost is the sum of costs of all resources consumed in the process of making a product and is classified into three categories: direct materials cost, direct labour cost and manufacturing overhead direct materials are the raw materials that become a part of the finished product; direct labour cost is
the cost of workers who can be easily identified with the unit of production while manufacturing overhead is any manufacturing cost that is neither direct materials cost nor direct labour cost. Manufacturing overhead for this project includes all charges that provided support to manufacture of the machine. This includes indirect labour cost which is the cost associated with workers who were not directly involved in the production and indirect materials cost that has to do with the cost of associated with consumables

The applications are as follows : -

1. Residential Cooling: Solar air coolers are ideal for home use in areas with warm climates. They provide an energy-efficient and cost-effective alternative to conventional air conditioning systems, reducing electricity bills and reliance on the grid.
2. Rural and Off-Grid Areas: For communities without reliable access to electricity, solar air coolers offer a viable cooling solution. They can improve comfort and health conditions in remote and rural areas by providing a sustainable cooling option.
3. Agricultural Storage: Solar air coolers can be used to cool small storage spaces, protecting agricultural products like grains, fruits, and vegetables from spoilage. By maintaining a lower temperature, these coolers help extend the shelf li fe of perishable goods in rural areas..
4. Outdoor and Recreational Spaces: Solar air coolers are suitable for outdoor settings, such as open-air restaurants, patios, and parks. They provide a cooling effect without the need for complex installations or a continuous electricity supply.
5. Temporary Shelters and Emergency Relief: In regions affected by natural disasters or emergencies, solar air coolers can provide immediate relief in temporary shelters. Since they are portable and do not rely on the power grid, they are practical for use in remote or damaged infrastructure.
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Conclusion :

In conclusion, a solar air cooler is an innovative, eco-friendly solution that offers significant advantages in energy savings and environmental impact. By utilizing renewable solar energy, it provides an effective way to cool spaces without relying on conventional electricity, reducing both operational costs and greenhouse gas emissions. Solar air coolers are particularly valuable in regions with high sunlight exposure, where they can offer reliable cooling in residential, commercial, agricultural, and remote settings.

While solar air coolers present some limitations, such as dependence on sunlight and the potential need for energy storage options, they are an excellent alternative to traditional cooling systems in the right environments. This project demonstrates that solar air coolers are not only feasible but also a promising solution for sustainable cooling needs, with potential for further optimization and wider adoption.

In conclusion, the solar air cooler project showcases a practical and eco-friendly alternative for cooling needs. By continuing to optimize the technology, solar air coolers have the potential for widespread application, particularly in areas where sustainability and energy savings are a priority.

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