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DESIGNING OF PELTIER POWERED SOLAR COOLER USING BLDC MOTOR

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Abstract- Presently the cooling techniques heavily rely on air conditioners, coolers, fans and dehumidifiers. These are the devices which runs on electricity. The electricity production is ultimately responsible for hot and humid conditions i.e. global warming. Hotness of the weather and the increasing humidity in the environment increased the usage of Air Conditioners and dehumidifiers. These systems are not suitable for the village areas with the long time power cuts. While solar power systems being considered as one of the way towards more sustainable energy systems, considering solar-cooling systems in villages would comprise of many attractive features. In recent scenario where peak demand of the electricity is increasing even after more reliable and efficient working of the equipment as the solar energy usage techniques are still not used upto the level in the residential homes, schools, offices. In addition to this, usage of BLDC motor for the purpose gives us the significant amount of decrement in the power consumption as low as the power consumption of a normal table fan. The use BLDC motor gives us the freedom of speed rotation and the noise free operation. The peltier cooling device in the assembly helps to increase the cooling capacity. This paper reviews solar powered BLDC operated and peltier air cooler for residential and industrial applications.

Keywords: BLDC motor, Centrifugal fan, coolingpad, PMMC motor, Solar battery C10, solar energy.

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INTRODUCTION

This paper shows the comfort conditions achieved by the device for the human body. In summer i.e. hot and humid conditions we feel uncomfortable because of hot weather and heavy humidity. So it is necessary to maintain tolerable thermal comfort conditions for living. Thermal comfort is determined by the room's temperature, humidity as well as air flow in the room. Radiant heat (hot surfaces) or radiant heat loss are also equally important factors for thermal comfort. Warmer air can hold up more moisture than dry air. When the 100% humidity is achieved the condition is called humidity. The temperature in a building is based on the outside temperature and sun loading addition to whatever heating or cooling is added or other heating and cooling sources. Room occupants i.e. living beings also add heat to the room since the normal temperature of body is much higher as compared to the room temperature. There is a need of such a source which is abundantly available in nature, which does not impose any bad effects on earth climate. Only one thing which can come up with the solution to all these problems is solar energy.

Unstructured, amorphous, and difficult to deal with algorithmically. The field of text mining usually deals with texts whose function is the communication of factual information or opinions, and the motivation for trying to extract information from such text automatically is compelling even if success is only partial. Research project selection is an important task for many private agencies and in government sector. The number of research proposal are received in government sector and research funding agencies has more than doubled in the past four years, with over 110 000 proposals submitted in one deadline in a year. Four to five reviewers are assigned to review each proposal so as to assure accurate and reliable opinions on proposals [1] [9]. To deal with the large volume, it is necessary to group proposals according to their similarities in research disciplines and then to assign the proposal groups to relevant reviewers. The scientific departments are the decision-making units responsible for funding recommendations and management of funded projects. The department is responsible for the selection tasks, and it dedicates the tasks to divisions or programs [3] [7]. Division managers or program directors then group the proposals and assign them to external reviewers for evaluation and comment

PROBLEM STATEMENT

The production of electricity is mainly responsible for hot and humid conditions i.e. global warming. As in below shown chart it is clear that major part of electricity is produced by coal i.e. fossil fuel. Fossil fuels also contain radioactive materials, including uranium and thorium, which are released into the atmosphere, which contribute to smog and acid rain, emit carbon dioxide, which may contribute to dangerous climate change. As well as the conventional motors which runs on the AC supply consumes significantly more amount of the electricity to operate. Where there is a problem with the production of electricity, the electricity consuming devices adds up into the problem.

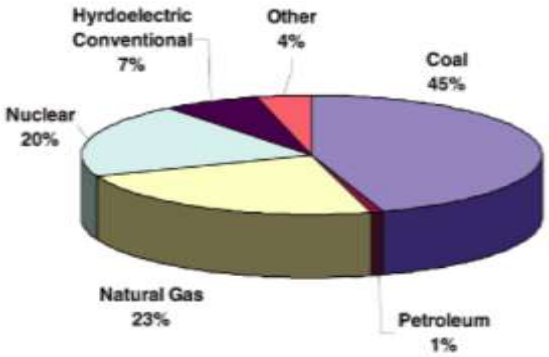

Figure 1: Production of electricity from different sources

PROPOSED SOLUTION

There is a need of such a source which is abundantly available in nature, which does not impose any bad effects on earth climate. Only one thing which can come up with solutions to all these problems is solar energy. [2]

3.1 OBJECTIVE THE PROJECT

To be aware of nonconventional energy source usage to reduce environmental pollutions. Provide solution for power cuts problems in villages. With replacement of existing costlier and high energy consuming cooling methods. Addition to this reduce the electricity bills with consumption reduction and minimizing the need of season wise servicing.

4. PROCEDURE

This assembly mainly consist of two sections:

4.1 SOLAR ENERGY CONVERSION

Solar energy conversion can be done by using rectifier and charge controller. As soon as sun light falls on solar panel, which converts solar energy into electrical energy by photoelectric effect. This electrical energy which is stored in the battery in the form of chemical energy. Charge controller can be employed in between solar panel and battery which prevents it from overcharging and may protect against overvoltage, which can reduce battery performance or lifespan, and may feature a safety risk. The stored energy directly can use for DC loads by using rectifier. [3]

4.2 COOL AIR GENERATION BY CENTRIFUGAL FAN

This converted energy is used by centrifugal fan to run it. This fan covered with cooling pads, through which water is passed at a specific rate flow. As the fan sucks the hot air make decision for project to classify on respective groups [4].

IV. TEXT MINNIG PROCESS

Although there are several text-mining approaches that can be used to cluster and classify documents. First, a research project containing the projects funded in latest five years is constructed according to keywords, and it is updated annually [3]. Then, new research proposals are classified according to discipline areas using a simple sorting algorithm. The new proposals in each discipline are clustered using a self- organized mapping (SOM) algorithm [9]. If the number of proposals in each cluster is still very large, they will be further decomposed into subgroups [1].

Phase 1: Funding agencies maintain a directory of discipline areas that form a tree structure in domain of different research areas. Research project is a public concept set of the research project management domain. The research topics of different disciplines can be clearly expressed by a research methodology of domain. Suppose that there are *K* discipline areas, and A*k* denotes discipline area
k(*k*= 12*, . . . , K*).

A research proposal can be constructed in the following three steps to represent the topics of the disciplines.

Phase 2: Classifying new research proposals in to disciplines areas to which they belong. A simple sorting algorithm is used next for proposals classification.

Phase 3: The main clustering process consists of five steps, as shown in Fig. 3 text document collection, text document preprocessing, text document encoding, By its cooling pads, the heat transfer occur between air and water thus generated cooled air enters into the room.

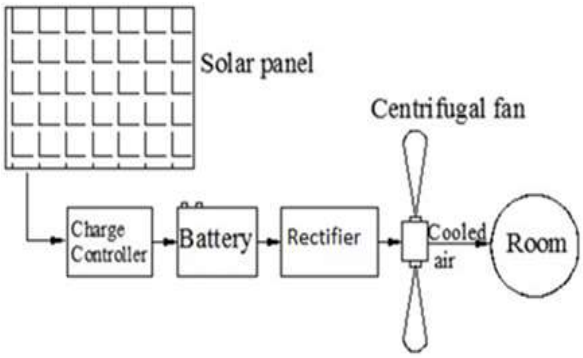

Figure 2: Solar energy conversion process

The concept is driven of cooler by solar energy. Components involved in this concept are solar panel, battery, charge controller, battery, rectifier, blower, and cooling pads. Solar panel is employed to convert solar energy into electrical energy by the way of photovoltaic effect. The generated electrical energy which is supplied to the battery for storage purpose through charge controller which prevents it from power fluctuations. As DC blower is used

for cooler, so need to convert AC load of the consumer to DC load by the help of rectifier circuit. Rectifier circuit converts AC load to DC. Load, now DC power can be supplied to the blower.

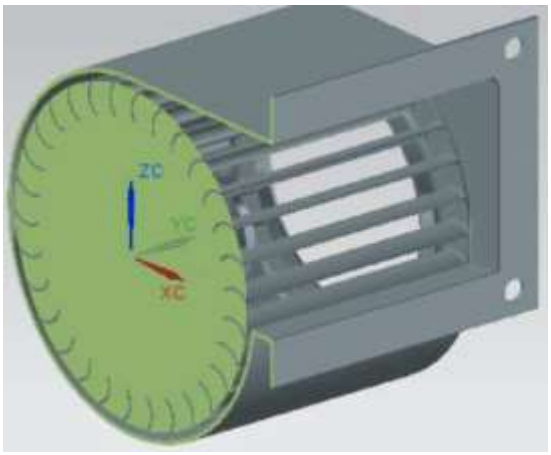

Figure 3: Section view of the fan

The concept is driven by solar energy. Components involved in this concept are solar panel, battery,charge controller, battery, rectifier, blower,cooler body and cooling pads. Solar panel is employed to convert solar energy into electrical energy by way of photovoltaic effect. The generated electrical energy is supplied to the battery for storage purpose through charge controller which prevents it from power fluctuations. As DC blower is used for cooler, so need to convert DC load from the battery to DC load by the help of rectifier. Rectifier converts AC load to DC. Load, now DC power can be supplied to the blower. This blower is surrounded by the cooling pads through which continuous water supply is provided. When the blower is turned on, blower sucks atmospheric air into the cabin through the cooling pads, mean time heat transfer occur between water and air, so the cold air enters into the room thus providing required thermal comfort conditions for living. PMMC (Permanent Magnet Moving Coil) is used for pumping the water to the top. can transform a feature-represented document into a concept represented one. Therefore, the target document corpus will be clustered in accordance with the concepts representing individual document, and thus, achieve the proceeding of document clustering at the conceptual level. The system uses the text documents for the clustering process. Initially document preprocessing is done. Then the next step is to identify the featured words. The feature selection process is carried out using improved Niching memetic algorithm and improved GA algorithm. Figure 4. Optimization Technique System

Then conceptual optimal weight is calculated and based on this optimal weight document clustering is performed. The concept weight is also called the Semantic weight. The figure 4 shows the overview of Optimization Technique system. Optimization technique is used in text mining for clustering of text document for optimal result.

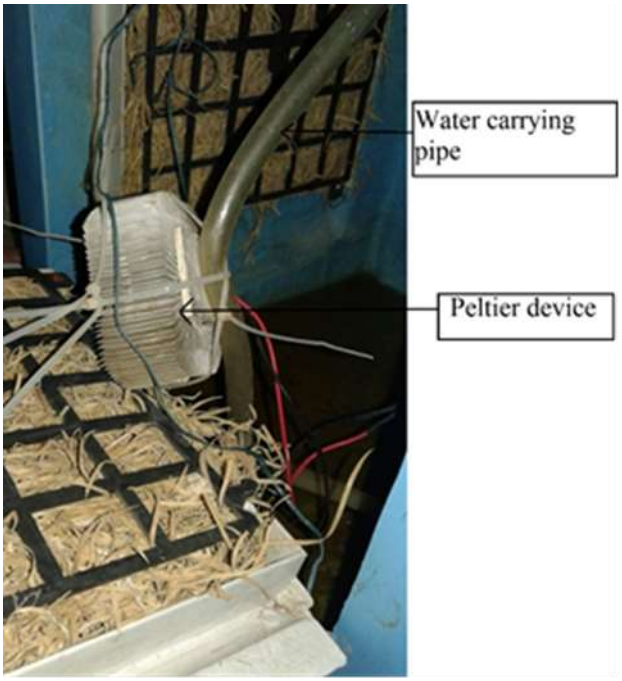

Figure 4: Peltier device

CONCLUSION

Solar cooler provides cool air for human comfort. For increasing the cooling efficiency, we use various mechanical devices such as Mechanical device such as Peltier device in solar cooler to provide extra cooling. These device has capacity to cool water. Peltier device may itself decrease its temperature upto -15^{o}C.So extra cooling air is supplied for and thus provide comfort for human being. Thermoelectric cooling uses the Peltier effect to create the heat flux between the junction of two different types of the materials. A Peltier cooler , heater or thermoelectric heat pump is a active heat pump which transfers heat from oneside of the device to the other, with consumption of electrical energy, which depends on the direction of current. Such a device is called as Peltier device. [5]

The ambient temperature, versus time of the day in which the experiment was carried out is presented in variations of ambient temperature which found in between 26ºC to 33.4ºC. The highest ambient temperature is obtained at 1.00 p.m. i.e. 33.4ºC. In general, the input temperature was found to be increasing from the morning to afternoon and then it is decreasing with little variations during evening. The maximum temperature difference was found to be 42 °C at 12.30 p.m. The temperature difference was increasing from morning to a peak value at noon and then was decreasing in the afternoon until sun sets, in a similar manner as the solar radiation and energy. The maximum temperature difference found to be about 40°C at 2.00 p.m. [9]

RESULT AND DISCUSSION

The output of the project is to achieve the comfort level for the human living in the rural areas where it is difficult to be dependent on the electricity for all the time. That is room temperature up to 25°C or less and relative humidity of 60%. Earlier in the traditional cooler, pump was used to lift the water up but in above stated concept of solar cooler the water flows down from the higher potential to downwards making the cotton and cooler grass wet. Thus this wet grass makes the air cool; even if the potential of water get lowers it does not create any kind of noise in the smooth working of the solar cooler. Therefore from the above mentioned facts we can conclude that the concept of solar cooler is so cost effective that it do not creates the overheads of maintenance or purchasing of pump neither it has to be sent for servicing for every season. So, we can say that the concept of solar cooler sounds good and economical hence almost every class of our society especially rural classes can bear its expenses.

CONCLUSION:

Comparing the cost of this product with the available products in the market is solar product appeals better and affordable by common people. This solar product perfectly suited for villages, schools and offices and electrical crises facing thus an alternate to the power cut problems. It comprises of many attractive features such as usage of solar energy, cooler and cooling cabin at lower cost, BLDC motor employment for noise free operation and peltier cooling booster. It is eco-friendly and natural electricity saver. Durability of the product is more which minimizes the cost. No electricity isused for assembly consumption, so this product saves the energy and saves environment from getting polluted.

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