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ECO-REFRI

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Abstract

One of the major problems that comes with summer season in the arid countries is rise in the temperature of water for both domestic and commercial building usage. At a persistent high temperature up to 55 °C for almost half of the year, people have to face challenging and sometimes unbearable hot water for drinking, bathing, and other general use. Cooling this water using conventional cyclic refrigeration is usually met with huge energy consumption that leads to upsurge in electricity tariff, and indirect rise in environmental pollution associated with all processes involved**.** Solar energy is an unlimited source of energy which is harnessed properly will get the mankind devoid of using the conventional sources of energy he has been long using .This project's main aim of keeping this in view to make the harnessing of solar energy more efficient. It is one of the fastest growing industries in the world.In this study, a portable mini thermoelectric refrigerator driven by a Peltier element is designed, constructed and tested. The Peltier element combined with fans on both sides is mounted onto a refrigerator box. An optimization for the operating conditions of the thermoelectric refrigerator is performed. The operating conditions of the system are the ambient temperature and voltages of the fans and Peltier element.The proposed system focuses on how to develop a refrigerator product system that not only stores water bottles but also provides cool water instantly. The Peltier thermoelectric cell was sandwiched between an external and internal heat sinks that acted to remove heat from the cooler box. When the Peltier thermoelectric cell connected to an external power source, the Peltier effect caused the heat from the refrigerator internal space to be conducted and removed to the ambient. The temperature can also be adjusted according to the respective seasons. In conclusion, the mini ECO-REFRI will probably be one of the obligatory products in the future.

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1. INTRODUCTION

The fundamental reason for having a refrigerator is to keep components cold. Cold temperatures help the materials present in the refrigerator to stay fresh longer. The basic idea behind refrigeration is to slow down the activity of bacteria so that it takes longer for the bacteria to spoil the components. So here we proposed a solar eco-friendly mini-refrigerator in which an instant water cooling system is arranged at a side. Generally, the refrigerators we use nowadays contains halo carbons which contribute to the green house effects. So, the eco-friendly refrigerator we proposed here is not only cost-efficient but also does not produce any harmful gases. Using this application, we can also save electricity as we are using solar energy.In 1834, thermoelectric based on Peltier Effect was discovered by Jean Peltier, in which the direct current (DC current) applied across two dissimilar materials causes a temperature difference. It is found that when current flows across the intersection between two different wires, heat must be consistently added or subtracted to maintain the temperature. Peltier Effect in one of three effects that categorized in the thermoelectric system, where are Seebeck Effect and Thomson Effect. Thermoelectric modules use the variations in the energy levels of electrons to provide heat transfer. The energy is carried by the current between low energy level P-type semiconductors and high energy level N-type semiconductors from the cold surface to hot surface. The Peltier model is made of a serial connection of P-type and N-type elements. The Peltier effect is produced when electric current flows through two different types of semiconductor metals. The current starts to transfer heat from one side to other. The cold side of the Peltier module can be used as a cooler while the other side will continuously heat. It is essential to cool the hot side to avoid the risk of damaging itself. Therefore, the Peltier must be combined with a cooler such as heat sink or water cooling to dissipate the heat of the hot side.

2. RELATED WORK

As per our survey, all over the globe, a lot of people are facing issues to control the humidity and keep their food and water in temperature less than the surrounding temperaturein summer. One of the topics which is gaining popularity is usage of solar energy because of its innumerous advantages. The main aim of the project is to make an eco-friendly refrigerator which is not only used for storing but also provides cool water instantly. Generally, any

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refrigerator uses and releases CNG gas for the refrigerator to work. But the proposed solution does not use electricity or any kinds of gases. A Peltier module is used so as to separate the temperature in and out of the refrigerator. The internal structure of Peltier element comprises semiconductor pellets. The array of pellets is connected in series but thermally arranged in parallel to maximise thermal transfer between the hot and cold steel surfaces of the module. A thermoelectric module comprising a Peltier element sandwiched between two steel plates of high thermal conductivity, with a power source, is effectively able to pump heat across the device from one steel plate to the other. The position of the sun varies as the sun moves across the sky. For a solar power equipment to work well, it must be placed near the sun and the solar tracker can increase the efficiency of that equipment at any fixed position.

3. IMPLEMENTATION

A solar based eco-friendly refrigerator is made. It is made in such a way that it does not release any harmful gases and is eco-friendly. Many refrigerators draw more energy than required and consumes a lot of power. They also release lots of harmful gases and hence it is advisable to not use such refrigerators.The project seeks to follow the following steps:To design a system to draw solar energy from solar panels.To design a system which doesn't release harmful gases.To design a system that is cost efficient and user-friendly.Here we propose an eco-friendly mini refrigerator in which an instant water-cooling system is arranged at a side. It is designed in such a way that it runs using solar energy when there is sun and battery in the other times. A temperature controller is used to control the system as the season changes. A Peltier module is used for cooling of water and also for the refrigerator. It cools down the system and takes out the heat. This system is totally different from all other refrigerators as it doesn't release any harmful gases and all the internal workings are safe and eco-friendly. The proposed system focuses on how to develop a refrigerator product system that not only stores water bottles but also provides cool water instantly. Refrigerator we use now a days contains halocarbons which contribute to the greenhouse effects. The proposed solution does not release any harmful gases and it is eco-friendly. A Peltier module is used so as to separate the temperature in and out of the refrigerator. The eco-friendly refrigerator can be used in schools and colleges by students and teachers as it is hard to provide everyone a refrigerator to store their needs. The Peltier thermoelectric cell was sandwiched between

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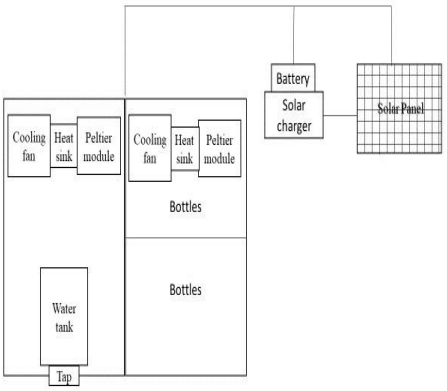
an external and internal heat sinks that acted to remove heat from the cooler box. When the Peltier thermoelectric cell connected to an external power source, the Peltier effect caused the heat from the refrigerator internal space to be conducted and removed to the ambient. The temperature can also be adjusted according to the respective seasons using W1209DIGITAL temperature controller thermostat module.

4. EXPERIMENTAL RESULTS

Here we propose a solar eco-friendly mini refrigerator in which a instant water cooling system is arranged at a side. It is designed in such a way that it runs using solar energy in the mornings and uses battery in the other times. We use a temperature controller to control the system as the season changes.A peltier module is used for cooling of water and also for the refrigerator. It cools down the system and takes out the heat.This system is totally different from all other refrigerators as it doesn't release any harmful gases and all the internal workings are safe and eco-friendly.The Peltier thermoelectric cell was sandwiched between an external and internal heat sinks that acted to remove heat from the cooler box. When the Peltier thermoelectric cell connected to an external power source, the Peltier effect caused the heat from the refrigerator internal space to be conducted and removed to the ambient. The temperature can also be adjusted according to the respective seasons using W1209DIGITAL temperature controller thermostat module.



Block Diagram

Working Model

5. CONCLUSION

The project gives the basic idea of grabbing solar energy and giving it to an

electrical object. The cost of this technology is very economical. The project is uses low-cost temperature controller thermostat module which is used for detecting the temperature and controlling whenever necessary. The device is discovered to have ample precision and total heat transfer capabilities while meeting its accuracy requirement. The cost and reliability of this eco-refri creates it suitable for the rural usage. The purpose of using solar energy is to help the people in reducing the cost towards electricity. Not only does it help in terms of electricity consumption but also helps the user to maintain their health conditions since it does not release any kind of harmful gases. It can be used for cooling small beverages, drinking water, medicines etc.So the overall implementation is low cost and is affordable by the common person.This project is used to improve the living standard.

6. REFERENCE

[1] Astrain D and Vian J G (2005), "Computational Model for Refrigerators Based on Peltier Effect Application", Applied Thermal Engineering.

[2] Sandoz-Rosado, Emil, and Robert J. Stevens. "Experimental characterization of thermoelectric modules and comparison with theoretical models for power generation." Journal of electronic materials 38, no. 7 (2009): 1239-1244.

[3] Tsai, Huan-Liang, and Jium-Ming Lin. "Model building and simulation of thermoelectric module using Matlab/Simulink." Journal of Electronic Materials 39, no. 9 (2010): 2105.

[4] Christian J L and Jadar R Barbosa Jr (2011), "Thermodynamic Comparison of Peltier, Stirling, and Vapor Compression Portable Coolers", Applied Energy, Vol.

[5] Isa, Toshiyuki, MasafumiMorisue, and IkukoKawamata. "Semiconductor device, electronic device, and method of manufacturing semiconductor device." U.S. Patent 7,608,531, issued October 27, 2009.

[6] SiddharthDongre, Gulab Chand Sahu "Energy &Exergy Analysis in Thermal Power Plants" National Conference on Knowledge, Innovation in Technology and Engineering, NCKITE-2015, on 10-11 April, 2015, at Kruti Institute of Technology and Engineering, Raipur and published in International Journal of Science and Research Vol. 4 Issue 5

[7] Roy J Dossat (2002), Principles of Refrigeration, Vol. 2.

[8] Optimization of operational conditions for a thermoelectric refrigerator and its performance analysis at optimum conditionsOptimisation des conditions de

fonctionnement d'un réfrigérateurthermoélectriqueet analyse de ses performances dans des conditions optimales

[9] Lineykin, Simon, and Shmuel Ben-Yaakov. "Modeling and analysis of thermoelectric modules." IEEE Transactions on Industry Applications 43, no. 2 (2007): 505-512.

[10] Mitrani, Daniel, José Antonio Tomé, Jordi Salazar, AntoniTuró, Miguel JesúsGarcía, and Juan Antonio Chávez. "Methodology for extracting thermoelectric module parameters." In Proceedings of the 21st IEEE Instrumentation and Measurement Technology Conference (IEEE Cat. No. 04CH37510), vol. 1, pp. 564-568. IEEE, 2004.