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Vegetable Storage Refrigeration Using Renewable Energy Source

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Abstract: In research article solar type of thermoelectric vegetable storage system by using renewable energy source i.g solar power and battery. This is working on DC power supply which is generated by the solar which is stored in DC battery. This storage system having 2 litres capacity which is refrigerator by the two number of peltier module (TEC1- 12706) heat sink and cooling system kit which is increases heat dissipation rate from hot side of peltier module. In the recent years we have many problems such as energy crises and environment degradation due to this increase emission of CO2 and ozone layer. Our project mainly utilities the energy of its operation solar refrigerator using thermoelectric module is going to be one of the effect to clean and environment friendly systems or easily carried by the user. This refrigerator is not need any compressor prime mower or gas or mechanical arrangement the main purpose of this project is to provide vegetables to his refrigerator by the where as electric supply is not possible

Keywords: Thermoelectric, Peltier module, Coefficient of performance.

I. INTRODUCTION

The our project is produced the refrigeration effective with the use of solar power and their model we use solar to save energy to eliminate the moving part of the in the common refrigeration. Generally normally refrigeration system has compressor which is run noisely operation in the peltier model reduce the problem the main advantage is noiseless operation and wireless due to no moving parts this is reliable, portable this is suitable for solar panel this energy save in battery which is environmental friendly thermoelectric cooling is working on principle of peltier effect which is the DC current is passed between to electrically dissimilar materials heat is observed at the junction the direction of the heat flow depends on the direction of the applied electric current and the relatives see back coefficient of the two materials module figure 1 is a solid state active heat pump which is consist of p and n type semiconductor couples connected electrical in series and the thermally connected in parallel sandwich between two thermal conductivity and electrically insulated substate.

II. BESIC CONCEPT

See back effect means when the two dissimilar metals pass voltage through there is production of heat or one side and cool at other side there is generating of electricity in this metals when the voltage increase or decrease the temperature will be increase or decrease this is peltier effect. When the heat side is cool down the work as a cooling and exact opposite is working as a heating this effect is used to as a cooling and heating application

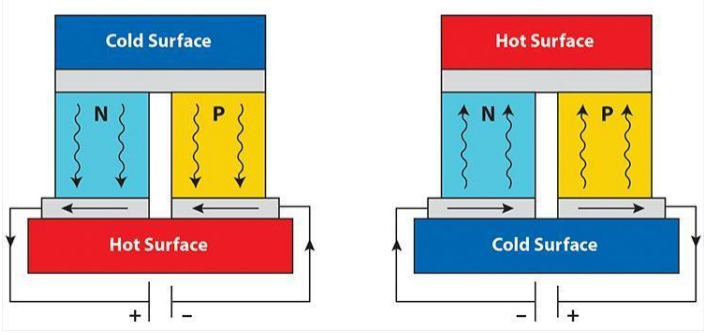

Fig. 1

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III. LITERATURE REVIEW

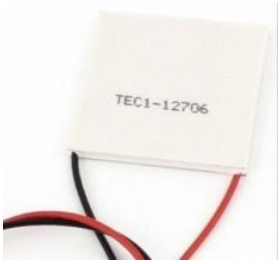
[1] Sujith G. Et al.(2016)

In this paper author design and fabricated the Thermoelectric Refrigeration to cool a volume of 40L using Principle of Peltier effect to cool and maintain temperature Range of 5°C to 25°C and the project is used only for light heat Load to lower its temperature to particular temperature. One of The advantage of this project is it takes low power to drive the Refrigerator.

IV. COMPONENTS DETAILS

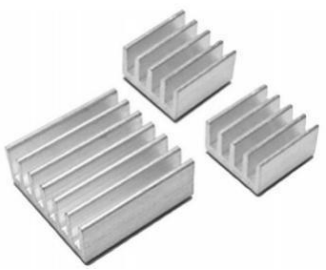
1) Peltier Module
2) Fan
3) Heat Sink
4) Battery
5) Solar Panel
6) Furniture
7) Thermocol
8) Digital temperature display

1) Peltier Module-When electricity is passed through the module, electrons move in one element and positive holes move in the other element, this is called the "Peltier effect." This allows one side of the substrate to absorb heat and the other to radiate heat, so the hot and cold sides to be switched depending on the current direction.



2) Fan- Fan is used to throw out the heat of peltier module which is increases form other side of module which increases the efficiency of refrigeration effect. Main purpose of the fan is cool down the module.

3) Heat Sink- A heat sink is a passive heat exchanger that transfers the heat generated by an electronic or a mechanical device to a fluid medium, often air or a liquid coolant, where it is dissipated away from the device, thereby allowing regulation of the device's temperature.



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4) Battery--This Li-ion Rechargeable 12v 7.2Ah Battery Pack has a nominal voltage of 12.6 volts and is a 3s4p battery pack. This battery pack contains three cells connected in series, giving it a capacity of 7200mAh. -The battery pack has a built- in BMS that protects the battery from overcharging, over-discharging.

Specification of Battery-

Charging Voltage-	12.6V
Charging Current-	3.6A
Nominal Pack Voltage-	11.1V
Max. Discharge Current- Tested for	7.2A

5) Solar Panel- Solar panels are those devices which are used to absorb the sun's rays and convert them into electricity or heat. A solar panel is actually a collection of solar (or photovoltaic) cells, which can be used to generate electricity through photovoltaic effect.

6) Furniture For Box- We use the furniture for the design the cabin we insert in the cabin thermocol to Store the vegitable or refrigeration in this cabin. The reason for using furniture is that we want to make the body of refrigerator for better strong and what if we are going to install the circuit of the peltier model in it, we are using furniture body to be mechanically strong and better mechanical protection.

7) Thermocol - It is a thermoplastic polymer of styrene which can be molded into objects. It is formed by the monomer styrene that results in the formation of polystyrene which is a synthetic polymer known as thermocol. It is used for thermal insulation.

It is light in weight.
It has low thermal conductivity.
It is tasteless, odorless and fungi resistance. Reliable

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8) Digital LCD Thermometer with Electronic Display- This is a temperature measurement module that can be used to measure refrigeration temperature and display it on the LCD screen

VI. ACKNOWLEDGMENT

It gives us a great pleasure to remain deeply indebted to our project guide Lecturer. Ms. S. A. Imandar under whom we have privilege to work. The faith & confidence shown by her in us boost our moral and motivate us to perform better in this project. Weconvey our sincere thanks to (Lecturer., Dept. of Electrical Engineering) for his timely co-operation. Finally, thanks to all staff members and all friends and colleagues who support us in the development of project

VII. CONCLUSION

The thermoelectric devices can be act as a cooler, heater, power generator are used in almost all fields such as military, aerospace, instrument, biology, medicine, industrial or commercial product. The major challenge is faced in this thermoelectric cooler is lower coefficient of performance in large capacity system. Thermoelectric chiling of beverage can be done at the farmer levels of inhibit any microbial change in quality of the beverage. In the coming years thermoelectricity has a lots of potential to create saving and effective solution for the industry and commercial as well. The minimum temperature achieved was found to be 15ºC

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