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Experimental Study of Non Refrigerant Air Conditioner using Peltier Effect

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Abstract: ***The present paper deals with the study of system uses "Thermoelectric cooling module" which works on thermoelectric refrigeration, aims to produce cooling by exploitation electricity result that states that once D.C voltage is applied over 2 junctions of variant electrical conductors, Endothermic reaction usually takes place in one junction and warmth is rejected at another junction which creates a temperature variation. Thermoelectric cooling systems have blessings over standard cooling devices, like compact in size, lightweight in weight, high responsibility, no mechanical moving elements and no operating fluid. The present air-conditioning system produces cooling result by refrigerants like Freon, Ammonia, etc. mistreatment these refrigerants will get most output however one amongst the key disadvantages is harmful gas emission and warming. These drawback is overcome by mistreatment thermo electrical modules (Peltier effect) air-conditioner.***

Keywords: Thermoelectric cooling module, endothermic reaction, standard cooling devices, operating fluid, refrigerants.

I. INTRODUCTION

Our aim is to introduce the new HVAC system mistreatment thermo electrical couple that shall overcome all the disadvantages of existing HVAC system.

Air Conditioning is that the science of dominant primarily 3 parameters of human comfort, temperature, ratio and air quality. Refrigeration is that the method of removing heat from the house so as to bring it to a lower temperature than close temperature. This Paper handles with the study of

"Thermoelectric cooling module " that works on thermo electrical refrigeration, aims to produce cooling by mistreatment thermo electrical effects instead of the a lot of rife standard strategies like „vapour compression cycle" or the „vapour absorption cycle".

Thermoelectric refrigeration works on the Peltier effect; electricity cooling technology employs of high sturdiness, no mechanical moving elements, compact in size, light-weight in weight, and no operating fluid.

It is steam-powered by electrical energy (D.C) electrical sources once a possible distinction or D.C current is applied across 2 junctions of dissimilar electrical conductors.

II. METHODOLOGY

A. Thermo Electric Module (12706) :

A thermoelectric module, additionally known as a thermoelectric cooler or Peltier cooler, could be a semiconductor-based electronic component that functions as a tiny low setup, moving heat from one aspect of the device to the opposite.

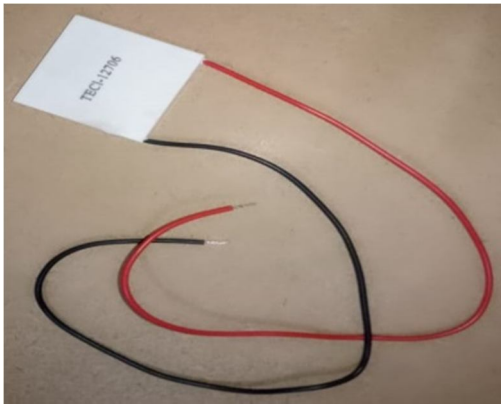


Fig 2.1 thermo electric module

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B. Blower Fan

The blower fan is additionally mentioned as centrifugal fan. A centrifugal fan may be a computer for diffusible air or different gases at orientation to the incoming fluid. Centrifugal fans typically carry a ducted housing to direct outgoing air during a particular direction, such an admirer is additionally mentioned as a blower fan.



Fig 2.2 blower fan

C. Exhaust Fan

A system of ventilation during which the fan attracts air through the workings by suction.

It is additionally wont to take away wetness out of a space. It helps to get rid of any odors. the first purpose of the fan is to manage the inside surroundings by discharging out smoke and different contaminants that are gift within the air.It is often integrated into a cooling or heating plant. It disperses the air harmlessly. It are often utilized in summers to push heat air out for temperature dominant. It are often used as another for cooling.



Fig 2.3 exhaust fan

D. SMPS(Switch Mode Power Supply):

The change regulator integrated with the electronic power provide for the conversion of wattage from one kind to a different kind that desired characteristics is labelled as swap mode power provide. SMPS delivers power from a AC or DC supply to DC hundreds such USA personal computers. It converts V and I characteristics. The pass electronic transistor of a change mode provides frequently changes between low consumption, full-off and full-on states, and allocates terribly less time within the high consumed transitions.

By this manner, it minimizes the wasted energy. in theory, there's no power dissipation within the switched mode power provide.



Fig 2.4 switch mode power supply

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E. Heat Sink

It is a passive device that transfers the warmth made by any electronic devices to air or liquid medium to take care of a relentless temperature throughout. it's largely used with high-powered semiconductor devices that has low cooling ability. it's created from copper or metal.



Fig 2.5 heat sink

F. Heat Sink Compound

The operation of heat sink compound is as describes below.

It is used to fill the space. Heat sink compound is designed in such a way that it can accurately transfer heat to heat dissipating device from the heat generating component.



Fig 2.6 heat sink compound

G. Digital Thermal Indicator

It is a tool that is employed to live temperature. it's simply moveable. it's permanent probes and a alphanumeric display. Its operate depends upon the kind of sensors used.



Fig 2.7 digital thermal indicator

III. WORKING PRINCIPLE

Thermoelectric air excitement works on the principle of Peltier impact, once Peltier modules are energized current flow takes place between the P&N kind semiconductor materials due to this heat is absorbed from one junction and heat is rejected at another junction that makes a temperature distinction by the flow of electrons. At the atomic scale, associate applied gradient causes charge carriers among the material to diffuse from the recent side to the cold side. presently the heat sinks that are connected to the Peltier module begin transferring heat flow and this energy is transferred to the surroundings with the help of cooler fans.

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IV. POWER SUPPLY

Power supply and temperature management are two different things that possesses to be thought of showing wisdom for a eminent Thermo electrical system. Thermo electrical system could also be a DC device. the nature of the DC current is important. Current and voltage is set by the charts provided by the manufacturer. the facility is that the merchandise of required voltage and current. (P = IV).

V. TEMPERATURE CONTROL

Temperature management is sometimes classified into two groups. One is open loop or manual and thus the choice is control system or automatic. For cooling systems typically cold facet is used as basis of management. The controlled temperature is compared to the shut temperature. associate on-off or a bearing victimization thermostat is that the only and best techniques to manage the temperature.

VI. COST ANALYSIS

In normal cooling system, the value of refrigerant gas is high. The conditioner should be maintained usually and thence, there is in addition a maintenance worth. The refrigerant gases need to be crammed usually and it costs charge. but among the advanced electricity module cooling, there isn't any refrigerant gases and thus the upkeep needed is in addition less. thence it's worth effective compared to ancient cooling system.

VII. EXPERIMENTAL SETUP

The figure displays the arrangement of the components used in the experiment.

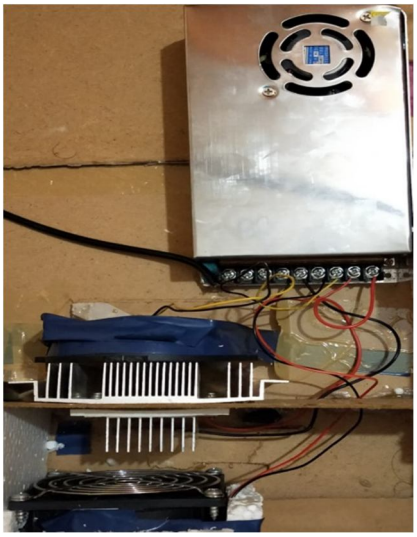


Fig 7.1



Fig 7.2

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VIII. OUTPUT

This system has acquire the refrigeration impact of degree of temperature 5.9 in Centigrade.



Fig 8.1

IX. ADVANTAGES

A. Thermoelectric module lacks moving parts or current liquid, hence, it's untouchable to leaks.
B. Its size is little but its efficiency is high.
C. Light in weight.

X. CONCLUSION

We achieved the goal that in spite of victimization harmful gas, our project works on simply electricity which we have a tendency to use borderline amount of electricity as compared to trendy cooling system. In spite of victimization whole huge ton AC to chill down a part, we've an inclination to used peltier primarily based AC to chill down oneself.
Cooling stabilizes at intervals ten minutes once the blower is turned ON (with a rate of 2.5 m/s). The system can attain a temperature distinction of set target that was 6°C.

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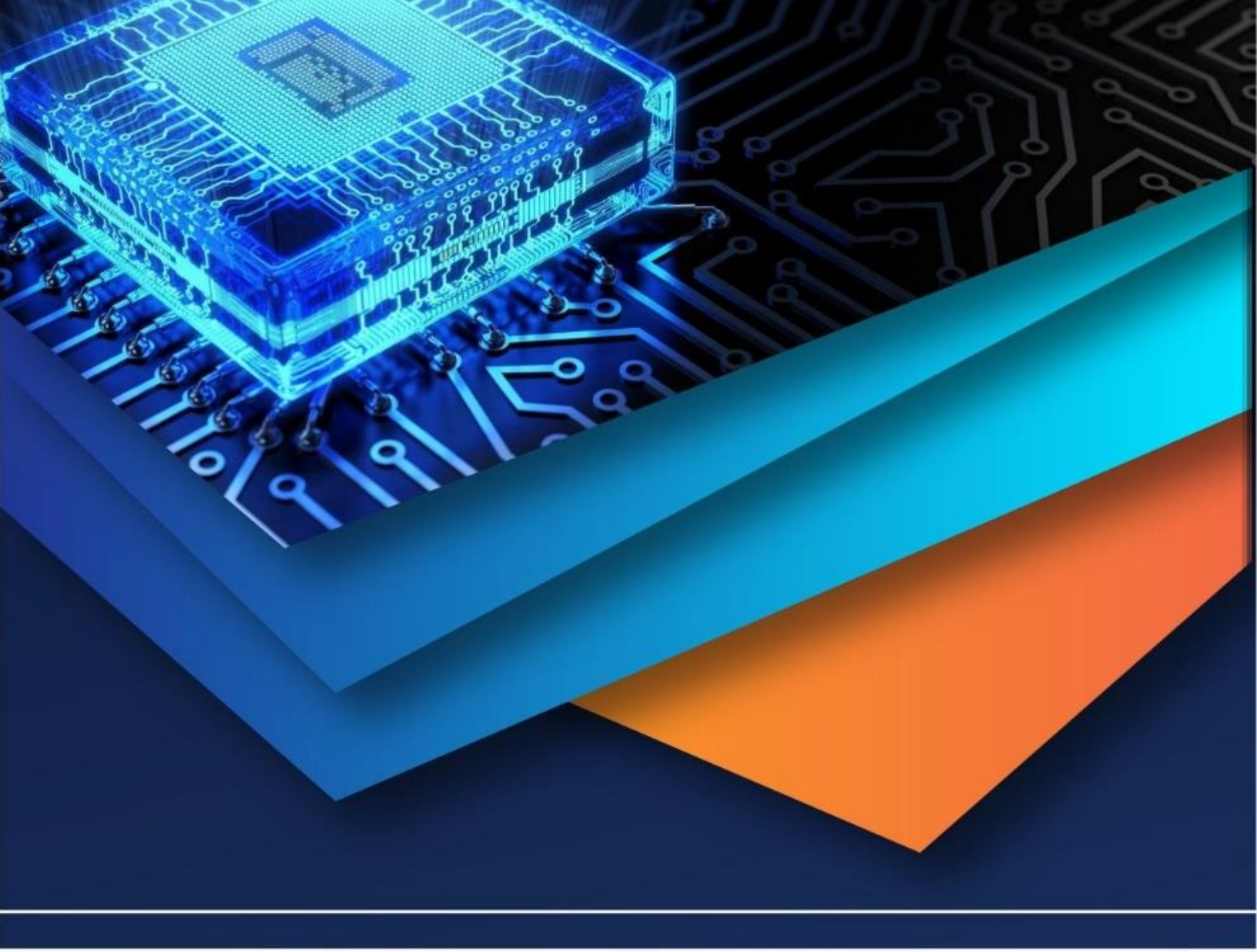
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