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LOW POWER WIRELESS SOLAR COOLING SYSTEM

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Abstract : The problem of global warming is becoming severe day by day. And the solution to stop or at least slow down this warming is the need to shift towards non-conventional energy resources. As we have learned since childhood, air conditioners are the major contributor to this warming. Also, the huge amount of electricity which they require at the time of generation harms the environment. To avoid these two major drawbacks, the power required for the air cooling system must be renewable energy i.e. solar energy. This solar energy powers up the AC system, which controls and maintains the temperature of a conditioned area. Nowadays, the necessity for temperature control has been in demand due to climate changes. Therefore, the usage and productivity of air conditioners are increased which leads to the consumption of a large amount of energy and cost too. This paper focuses on the enhancement of cooling on a Direct Current (DC) Air cooling system integrated with the 'Peltier' module. This is completely run over a solar panel which stores charges to the battery and thus will be supplied to our air cooling system. A voltage regulator has been designed to supply a sufficient current that is required for the Peltier module to operate. This air cooling model will reduce the cost, be renewable, and be environmentally friendly.

Key Words: Solar Cooler, Wireless, Node MCU, Peltier.

I. INTRODUCTION

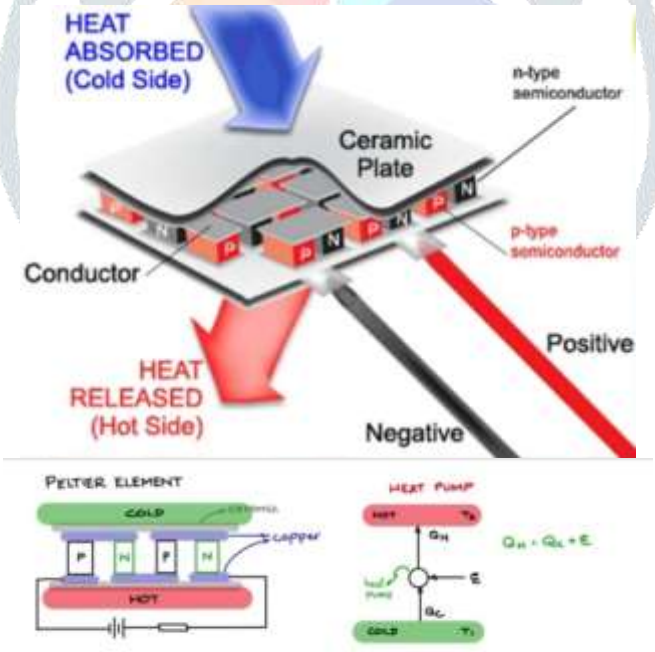
Solar energy is solely usable energy generated from the sun within the form of electric or thermal energy. The demand for air cooling is increasing due to the effects of global climate change and heating. From all other available sources, sun energy is that most abundant, and it's comparatively easy to convert it to electrical energy. A Peltier Cooling System relies on D.C. Voltage running through two junctions joined by thermocouples. Solar Air Heater could be a device during which energy transfer is from a distinct source of energy to air. Air Cooling is defined because the simultaneous processing of temperature, humidity, purification, and distribution of weather conditions in compliance with the need for space needing air cooling. The project is split into two stages, which are hardware and software development. In hardware development, solar panel have been used for capturing sources of illumination and to charge the battery. The Node MCU Microcontroller is employed within the primary control circuit. The development and implementation of solar-driven refrigeration technologies might contribute to achieving significant primary energy savings in households, offices, and various industries. Solar energy would be a great alternative to the conventional grid system to run cold storage facilities. The system was able to maintain a temperature of 15 - 45◦C and a relative humidity inside the storage chamber. Backup was provided, electric battery bank cannot maintain required cooling conditions just in case of prolonged cloudy weathers. The system is operated on alternative energy, but has a further feature to be utilized in hybrid mode (operated on battery and grid). The research hypothesis is to develop a cold storage unit which may run continuously on solar power for decentralized preservation of perishables by employing a solar grid hybrid system which automatically utilizes the total potential of obtainable solar energy (as a first priority and switches to battery and utility to batteries or utility for extra energy demand if required) as well as using cooling as a backup source to store extra cooling produced by a cooling machine and maintain the standard of a stored product during storage time.

II. LITERATURE SUREVY

This paper reveals the comfort conditions achieved by the device for our body. Solar energy conversion process is completed by battery. As sun rays fall on solar panel, which convert solar current into electrical energy by photoelectric effect. [1]This paper aims to show that the Solar air heaters are renewable energy. heating is accustomed process for heat generation. Minimum maintenance occurs like cleaning of collectors. Utility produces zero cost heat. It's environment friendly and natural electricity saver. Electricity doesn't used so this product saves energy and saves the environment from getting polluted.[2] This paper, a DHT11 sensor, is used as a temperature and humidity sensor. The DHT11 temperature device is interfaced to the pin of the NODEMCU board, through its built-in ADC, which converts these readings and displays that on the LCD, to the point temperature of the device. The electric switch within the NODEMCU board, the user-defined temperature settings will be done. Few electric switch won't to set the temperature by increment (INC), for increase and decrement (DEC) for decrease settings.[3] This paper reveals that the prevention of solar panel from any environmental effect. Panels The drop of rain falls on the solar panel and then get the dust particles which we deposited already and it would stay as a stain forever. When degrade soon. Our project aims that this difficulty is overcome.[4] The main objective of this paper is to design a multi way technique to regulate relay based module temperature sensors. A relay is an electrically operated switch. Relay can operate mechanically called as electromagnetic relay and few are relay is that the solid state relays. Where ever relays provide electrical isolation between a sensing circuit and an actuating circuit, or multiple circuits are controlled by one signal.[5]The purpose of this paper is to confirm that the battery is rarely overcharged, once it's fully charged by diverting power. Most of the Solar system needs a charge controller. Providing a very small electrical device like a battery saver is employed to charge an oversized battery, is it possible to try and do without a controller.[6] This Paper aims that the warmth naturally flows from hot places to cooler places. The heat inside the room is absorbed and so transferred to the outs.[7]

III. BASIC PRINCIPLE

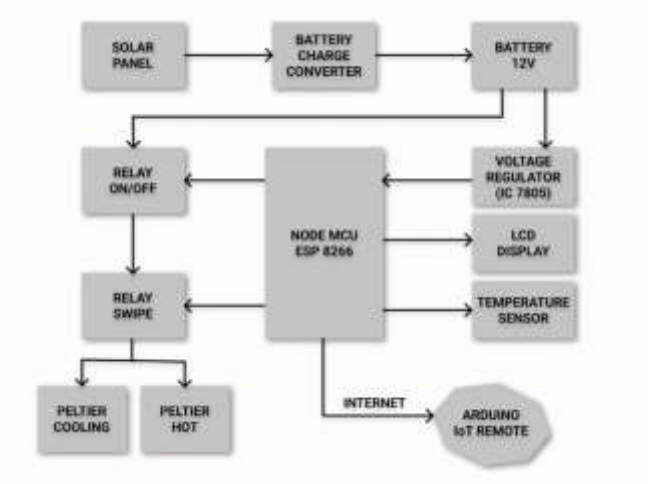
Semiconductor is selected because they can be suitable and perfect heat pumping material. The current entering through positive terminal of the peltier and goes alternatively through p type and n type of semiconductor. The electron which have high energy willing to reach low energy level. In this process, they loose their energy in the form of thermal or heat energy. Due to this, accumulation of electron on one side is more than the other side which create potential difference between two terminal of the peltier.



Coefficient of the performance = COP = Q_c / E

Where,
Q_c – Energy extracted from cold juction
E – Electrical energy needed to pump
Q_h – heat energy

IV. BLOCK DIAGRAM



V. PROPOSED METHODOLOGY

Solar panel is a main component of our project. It is INPUT part, it take Solar Energy from sun & Convert it into Equivalent DC voltage. Each cell of solar plate produce 0.5 V. The output of solar panel is fed to the input of the charge controller which have 3 port input output and adjustable port. The output of charge controller, charge the Battery through the diode. The adjustable port is for to adjust the or terminate the connection between input & output port. Once the battery is charged RED LED glow, which is input through zener diode voltage. As we switch ON the switch, the supply goes through relay & On the Peltier 1 which is for cooling purpose. The supply May distorted or disrupted while switch on or OFF hence we use capacitor C1 and C2 for noise, Capacitor C3 & C4 are used. There is one voltage regulator IC which provides required voltage to the Node MCU. Node MCU is an IC which plays a software role in our project. By doing Cloud Computing and IoT based programming, we are able to de manage ON/OFF condition of peltier 1 & 2, also temperature. We also connected one LED display to show temperature and which is operated i.e. cooling or hot. Temperature sensor notes the temperature of that particular area. By taking this data display also shows reading of temperature.

VI. CONCLUSIONS

This paper has presented the energy saving estimates that are in context of improvement of cooling system using solar energy utilizing 'Peltier' module. As an conclusion, here we end it up with a low cost and solar powered air cooling system is reachable and marketable in reality.

- Using solar energy as the power source, it's ended up being feasible.
- It is proficient to use solar energy as a sustainable wellspring of energy.
- Improves the air quality.

Lastly we would want to feature that it'd have conceivable to furnish an adapted air with sun oriented wellspring of energy and furthermore improve cooling during this framework.

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