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SOLAR BASED MINI REFRIGERATOR FOR MEDICINE PRESERVATION

[1]Shubham Gujar, [2]Priyanka Harale, [3]Akshada Jadhav

Dr. P.B.Mane

[1]Electronics and telecommunication, AISSMS IOIT, Pune

[2]Electronics and telecommunication, AISSMS IOIT, Pune

[3]Electronics and telecommunication, AISSMS IOIT, Pune

Abstract: Globally, there is a growing need for refrigeration in the industries of air conditioning, food preservation, vaccine storage, medical services, and electronic device cooling. which has resulted in increased electricity production and increased CO2 emissions worldwide, both of which are factors in climate change and global warming. Thermoelectric refrigeration is a new option that is projected to play a key role in the present energy crisis because it can convert waste electricity into useful cooling. As a result, thermoelectric refrigeration is crucial, especially in developing nations where a long lifespan and minimal maintenance are required. The goal of this project is to create the Peltier effect used by SL's thermoelectric refrigerator's inner cooling volume to cool and maintain a specified temperature between -50 and 100 °C. The design criteria are to cool and offer retention for at least the next 30 minutes within 6 hours. The Thermoelectric refrigerator's final design for application as well as the design variations available to meet the requirements is discussed.

I. INTRODUCTION

Currently, as the population grows and living standards rise, there is a corresponding rise in energy demand. Any nation's social, economic, industrial, and technological progress depends heavily on energy. By minimizing the use of fossil fuels, power, and pollutant emissions, rational energy use benefits the environment and the economy.

Renewable energy sources must be a major component of the energy solution for the storage of life-saving medications or vaccinations in the numerous areas of developing countries where the power supply is still unstable. Solar energy stands out as the best cooling candidate among the various renewable energy sources because the peak cooling load and the peak solar radiation input coincide. In comparison to other conventional cooling systems, solar-powered cooling has a tremendous promise for cheaper operating costs, improved dependability, and longer working lives. It may also help to slow down global warming.

II. LITERATURE SURVEY

The Development of a Picnic Refrigerator Powered by Solar Energy by Adedeji, Kasali A, Olaleye, Joshua O, and Babs-Fashola, Lukmon, Salami, and Fatai Opeyemi,2020, 7(2).

The technical performance of the solar-powered refrigeration system is examined in this research. The cooling impact of the refrigerant was used to calculate the refrigeration unit's coefficient of performance. 180 minutes of day and night were used for the experiment. Every 15 minutes, the inner chamber's temperature was recorded. The compressor was powered by electrical energy from the solar panel during the day, and the battery was activated at night.

Jayapal Reddy, Mrs. ROOPA Fast cooling medical supplies for remote and flood-prone locations, Prashanth Patil, and the website IEEE.in describes solar-powered dual-mode battery charging (ISSN: 2348 4748, Volume 1, Issue 4, April 2014).

Natural disasters are people's main worry right now. This is happening as a result of numerous human influences, such as pollution, deforestation, soil erosion, etc., and numerous other influences that lead to natural disasters. So, one of the

challenging issues in medicine in flood-affected areas is refrigeration. Therefore, we are trying to solve this problem in our project. through the creation of a portable, solar-powered refrigerator.

R.Field.Photovoltaic/Thermoelectric Refrigerator for Developing Country Medicine Storage. 1980; Sol Energy 25(5),
The thermoelectrically cooled refrigerator that runs on direct current is perfect for pairing with a collection of a high-tech battery power system, 18 V d.c. lead-acid, solar cells, and other energy-efficient devices. A design for a foldable, transportable, photovoltaic/thermoelectric refrigerator is proposed in this paper. The device must be extremely durable and user-friendly. The system's components are readily available for purchase. Estimates of the system's expenses are provided in the study.

"Review on portable solar thermoelectric cum air cooler," by Ekta Mourya, Anurag Yadav, David Samuel, Suprabhat A. Mohod, and Manoj B. Dhawadeand Vaibhav N. Deshpande.
This report provides a thorough analysis of the available technologies for solar thermoelectric cooling applications. This mobile solar thermoelectric refrigerator/main cooler's goal is to offer an affordable replacement for current cooling systems. The refrigerators in our homes are too traditional; a portable refrigerator with a cooler that runs on solar power is a better alternative. We have been consuming a lot of energy as a developing civilization, and the non-renewable energy sources are running out. This clarifies the study's area of interest.

The Design And Development Of Thermoelectric Refrigerator by Mayank Awasthi and K V Mali (2012) ", Vol. 1,No.3,October2012, International Journal of Mechanical Engineering and Robotics.
The goal of refrigerator development is to deliver effective cooling in predetermined places. As can be seen from the information above, this refrigerator can sustain an interior after 20 minutes of nonstop electricity, the temperature is still holding steady at 16.5 "C. Additionally, the battery's full charge period. After 3.2 hours, the fridge will stop functioning and the battery will run out. The insulation will then allow the temperature inside the fridge to rise very slowly.

III. METHODOLOGY

i. In this project we stimulate a refrigerator where such medicines and vaccines are stored for cooling, we used a thermocouple system and solar panels for absorbing solar energy from the sun.

ii. When the solar panels absorb energy from the sun it is given to a lead-acid battery to convert into electrical energy.

iii. This electrical energy is given refrigerator for cooling medicines and vaccines.

iv. This project is intended for the development of a solar-based compressor-free mini-fridge. This refrigerator will work well for cooling small items and will chill items relatively quickly compared to other refrigeration systems. Likewise, for backup, this fridge will be a solar-connected connected battery so during the daytime continuous battery will be charged through the solar plate.

v. In case the battery will be not charged or is low so it will be immediately indicated to the LCD.

IV. PROPOSED METHOD

Step1: Changing Photons into Electrons in Photovoltaic Cells Photovoltaic (PV) cells are the solar cells you see on calculators and satellites. As the name suggests (photo means "light" and voltaic means "electricity"), PV cells use sunlight to generate power.

Step 2: This electricity produced is stored inside a 12-volt lead-acid battery. The voltage regulator IC 7812 maintains the output voltage to the system.

Step 3: The electrical power from the battery is supplied to the mini-fridge where due to its cooling effect the medicines or food may be stored or preserved for a longer time to be used in critical conditions.

Step 4: The modest chilling operations would now be performed by Solar Refrigerator. where cooling is urgently necessary.

3.1 HARDWARE DESIGN

1. ATMEGA 328

A single-board microcontroller called Arduino facilitates the use of electronics in cross-disciplinary projects. Straightforward hardware is an open-source hardware board based on an 8-bit Atmel AVR or 32-bit Atmel ARM microcontroller. A bootloader that runs on the microcontroller and a compiler for a popular programming language is included in the package.

2. Solar panel -12 volt

Photons are converted to electrons in a photovoltaic cell. Photovoltaic cells, as their name suggests (photo means "light" and voltaic means "electricity"), are the solar cells you see on calculators and satellites. They use sunlight to generate power. A solar panel or module is a collection of interconnected solar cells that can be combined to form bigger solar arrays. Silicon, which is currently the most widely used semiconductor, is one of the unique materials utilized to create photovoltaic cells. A fraction of the light that enters the cell is absorbed by the semiconductor material. This indicates that the semiconductor receives the energy of the light that is absorbed.

3. Peltier plate

To produce an electric current, conductors are connected and a voltage is applied across them. Heat is removed at one junction and cooling takes place when the current passes through the junctions of the two conductors. At the opposite joint, heat is deposited. Cooling is the primary use of the Peltier effect.

4. Mini Fridge

Within five minutes of being plugged in, its built-in cooling plate immediately decreases to its lowest operational temperature. You can utilize the fridge in your home office, bedroom, garage, or cubicle. It is battery-free and compatible with all PC operating systems. Simply insert your canned beverage, plug in the USB port, and enjoy.

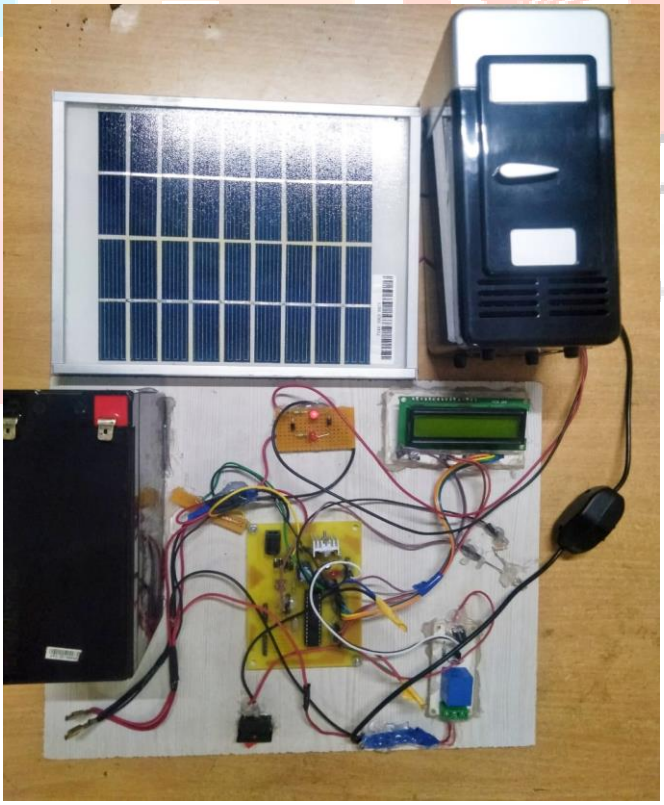

Fig.1.Hardware design

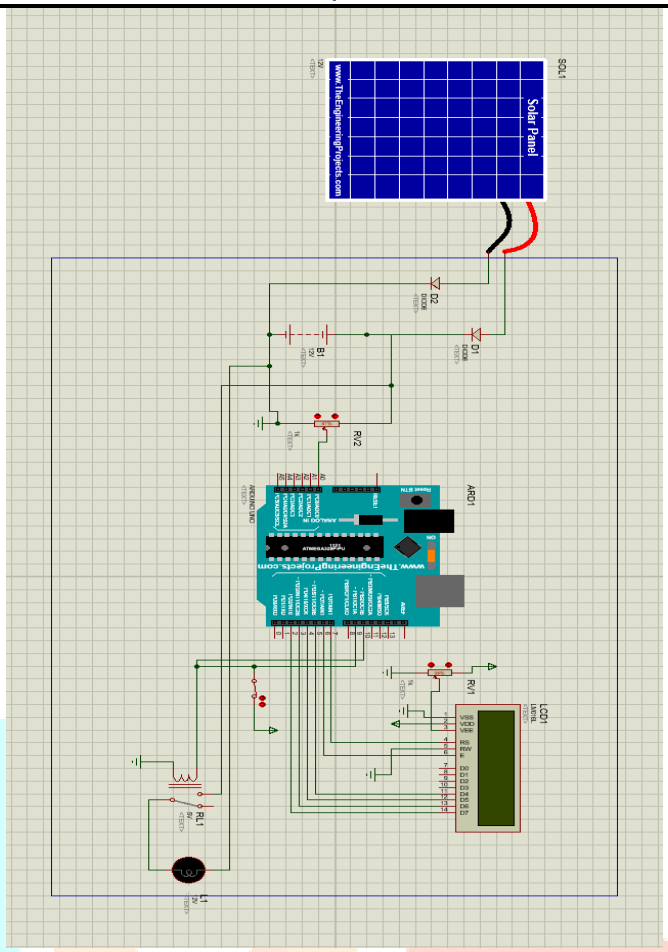

Fig.2. Circuit Diagram

3.2 SOFTWARE DESIGN

1.Keil

Keil compiler is software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.

2.Proteus

It is a program for designing circuits that Labcenter Electronics created. It was once used to simulate various circuits and develop various circuits for use on printed circuit boards. Any electronic circuit project that uses proteus will be more affordable and less likely to make mistakes thanks to the program's schematic construction capabilities.

V. RESULTS AND DISCUSSION

The goal of refrigerator development is to deliver effective cooling in predetermined places. As can be seen from the statistics above, this refrigerator can maintain an interior temperature of 16.5 °C for 20 minutes while receiving a constant power supply. Additionally, when the battery is fully charged, the refrigerator will run for 3.2 hours before discharging, at which point the insulation inside will cause the temperature to rise only very slowly. Based on the aforementioned information, it can be concluded that the refrigerator is suitable for minor chilling activities where cooling is needed quickly. This system comes with a solar panel charge controller that makes it simple to use the solar panels to recharge the battery. Additionally, in a battery charger that uses a standard, there is a provided 220-volt ac supply that can be used to charge the batteries is also included.

VI. CONCLUSION AND FUTURE SCOPE

The major goal of this project was to create a small solar refrigerator without a compressor, and it was a success. This refrigerator has several different uses and may be placed in different locations to perform several tasks. The fundamental goal for which this refrigerator was designed is also being met because

there is enough capacity inside it to cool the necessary quantity of medications and injections for primary healthcare facilities in communities with intermittent or no power supply.

Even though this refrigerator is operating adequately and to its full potential, there are still a lot of tweaks and enhancements that can be made to it to make it more user-friendly and advanced. If these procedures and modifications are put into practise, they may have a significant impact on the future models that are created.

VII. REFERENCES

[1]. Adedeji, Kasali A, Olaleye, Joshua O, Babs-Fashola, Lukmon, Salami, Fatai Opeyemi, The Design and Development of a Solar-powered Picnic Refrigerator, www.jsaer.com 2020, 7(2):44-52

[2]. Mrs. ROOPA. C, Jayapal reddy Prashanth Patil, Rakesh Byakod, medicine refrigeration for rural and flood-affected areas–fast chilling solar-based dual-mode battery charging Website: www. IEEE.in (ISSN: 2348 4748, Volume 1, Issue 4, April 2014).

[3]. Field R. Photovoltaic/Thermoelectric Refrigerator for Medicine Storage for Developing Countries. Sol Energy 1980; 25(5): 445

[4]. Manoj B. Dhawade, EktaMourya, AnuragYadav, David Samuel, Suprabhat A. Mohod, Vaibhav N Deshpande, "Review on portable solar thermoelectric cum air cooler".

[5]. Mayank Awasthi, K V Mali (2012), "Design And Development Of Thermoelectric Refrigerator", International Journal of Mechanical Engineering and Robotics, Vol. 1, No. 3. October 2012.