

HIGHLY EFFICIENT POWER GENERATION USING PELTIER MODULE

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Abstract: Generating electricity in present there is a shortage of fossil fuel, oil, gas, etc. burning of these fuels causes environmental problem like radio activity pollution, global warming etc. So that these (coal, oil, gas) are the limiting resources hence resulting new technology is needed for electricity generation, by using thermoelectric generators to generate power as a most promising technology and environmental free and several advantages in production. Thermoelectric coolers can convert directly thermal (heat) energy into electrical energy. In this TEC there are no moving parts and it cannot be produce any waste during power production hence it is consider as a green technology. Thermoelectric power generator convert direct waste heat in to generate electricity By this it eliminated emission so we can believe this green technology. Thermoelectric power generation offer a potential application in the direct exchange of waste-heat energy into electrical power where it is unnecessary to believe the cost of the thermal energy input. The battery which is used can be recharged with the generation inputs like Peltier. The battery is connected to the DC Boost Converter& inverter. From this energy the ac motor can be controlled using inverterdesign.

IndexTerms— Solar energy, Wind energy, Hydro energy, MATLAB & Programmable Interrupt Controller

INTRODUCTION

Recently we are depending upon fossil fuels for maximum electricity generation. However, the reserves of fossil fuels will be goes on depleting, since oil & gas are the least sources. Recent years .cost of unit electricity has increasing to unpredictable levels due the less supply of (oil gas coal). Thus the, green energies are more attractive artificial to electricity generation, as it will also provide a pollution free and cost less. In this innovative project, we are using one device which is used to be created and introduced by human as a renewable energy that is thermo electric generator equipment to generate electricity As we know Renewable energies are, solar energy, wind energy, hydro energy, tidal energy, etc. above energies can produce electricity in different forms and way of generating method.

There are some disadvantages. Solar cells are the most commonly used in applications such as household industrial and spacecraft electrical systems. However, if there is no sunlight there will no production of electricity alternativesources are necessary for generating electricity. or a method of storing energy for future use. Wind and hydro electric energy have

their own drawback making them less power production and insufficient for wider usage.. [3]

The device by converting heat energy to electrical energy. This thermoelectric generator is suitable power for space research, Satellites and even unmanned facilities. Satellites are settled at the planets that so far from the earth. For example, thermoelectric devices can be used in vehicles to producing electricity using the waste heat of the engine also. TEG is used to convert thermal energy (heat) into electricity based on "Seebeck effect" directly. Here there is charge movement in the media. Advantages of Thermoelectric power generators are. - Small size and less weight. . - Green Technology. - increase the overall efficiency (5% to 8%). –

Alternative power sources of energy. - It requires less space and cost compare to other source waste heat to generate the power is to decrease the cost-per-unit of the devices. TEG can be used in, Jet Engine parts, IC Engines parts, Furnace cover, Hot water tubes, Refrigerator Computer/laptop Body heat etc.. M. Jaegle Electro-thermal interaction is commonly considered only as a matter of joule heating. In addition, the Seebeck-, Peltier- and Thompson Effects are significant in materials with high thermoelectric figure of merit Z . These thermoelectric materials have a high Seebeck coefficient α , a good electric conductivity σ , and a poor thermal conductivity λ . They have widespread areas of application.

Thermoelectric systems are used for measurement techniques (thermocouples, thermopiles...), for peltier-cooling (Peltier- elements for CPU-Cooling, refrigeration, temperature stabilization...) and direct energy conversion of heat (thermoelectric generators, driven by waste heat, radioactive decay, combustion...). For an accurate modeling of these applications the thermoelectric field equations have to be solved. Julius T. Sese, Joseph Bryan G- This paper presents a study on harvesting electrical energy with the use of thermoelectric coolers (TEC) or peltier tiles using body heat in different workout activities. The harvesting circuit composes of a Peltier tiles, joule thief circuit and rechargeable battery. The TECs will exhibit the Seebeck effect phenomenon in which a voltage is produce when there is a temperature difference between two dissimilar conductors. Each side of the tiles will be the hot side and cool side which are interchangeable depending on the flow of current. Joule thief performs as a self - oscillating voltage booster circuitry for small power applications.

The rechargeable battery store the voltage collected from the joule thief. Rohit Sharma, Vivek Kumar Sehgal- This paper demonstrates an environmental friendly methodology for implementing an air conditioning or refrigeration system. In particular, the cooler does not deplete the earth's limited fossil fuel reserves nor does it harm the global environment either by depleting stratospheric ozone or by contributing to global warming through the emission of greenhouse gases. The electrical energy input needed to power the cooler is supplied from a solar panel. The air conditioning based on thermoelectricity may play an important role despite lower cooling performance compared with gas compression cycles. With the usual arrangement of a heat sink on each side of the Peltier device, air would be directed away on the hot side and forward on the cool side, thus cooling the surrounding area.

1. DESCRIPTION

The reserves of fossil fuels will soon be depleted, since oil is a limited resource. Over the years, the cost of electricity has risen to unprecedented levels due the limited supply of oil and economic and political factors. Wind energy, hydro energy and with other technologies which have their own limitations, making them insufficient for wider usage. The most important factors for choosing the kind of renewable generators are location, time and user needs.

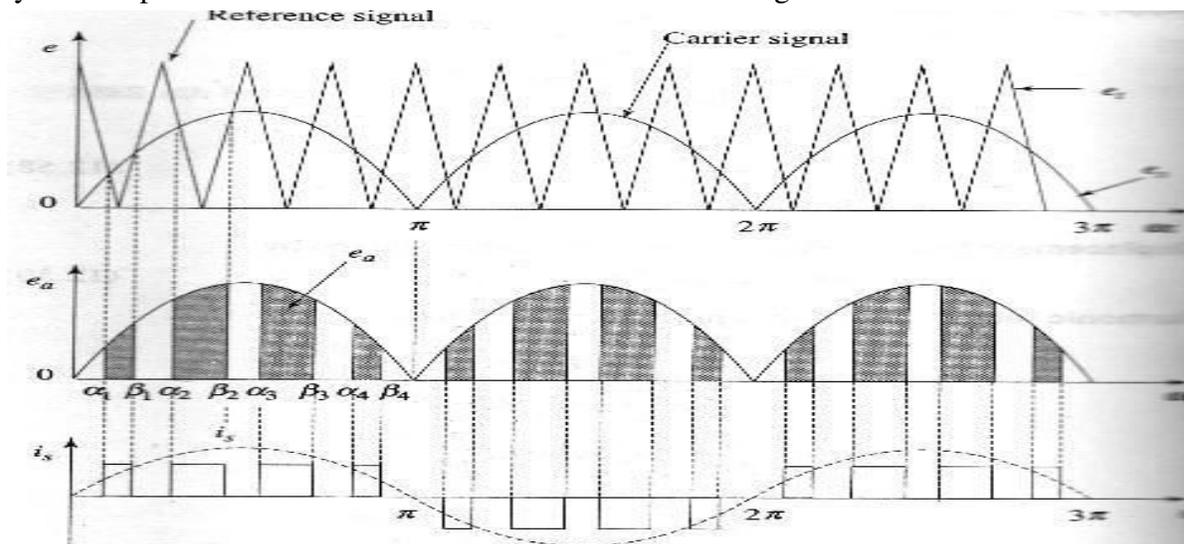
Location associates information about climate, energy sources availability and environment conditions, this information is very important to decide In this project the conversion of waste heat into generate electricity by using thermoelectric Cooler (TEC).Waste may refrigerator heat, vehicle radiator heat, laptop heat, even body heat can be used as a input source as a waste heat to generate electricity and it can be charged directly mobile battery and also stored in a rechargeable lead acid battery for further usage. And also waste energy human body locomotion also produce electricity body weight locomotion of the energy in to electrical energy by using electromagnetic induction principle. The control mechanism carries regulator circuit etc. and the power saving mechanism carries microcontroller relays etc. When the two sides of semiconductor are maintained with different of the temperature, the EMF is flows across the output circuit.As the heat moves from hot side to cold side, the charge carrier moves in the semiconductor materials and hence the potential deference is created. The electrons are the charge carriers in the case of N-type semiconductor and Hole are in P-type semiconductors. In a stack, number of P-type and N-type semiconductors is

connected. A single PN connection can produce a Seebeck voltage of 40mV. The heat source such as natural gas or propane are used for remote power generation.

PWM TECHNIQUE

Here, the power semiconductor devices are power BJT, power MOSFET and IGBTs. These devices can be turned ON and turned OFF by using control signals. Fig show general block diagram of PWM inverter It consists of power circuit and gate triggering circuit. The power circuit may be single phase or three phase inverter. The comparator compares reference signal and carrier signal. This output is fed triggering unit. It gives pulses for inverter. This pulse fed to the inverter through amplifier and isolator.

Inverter output voltage can be controlled by varying pulses (i.e.) ON and OFF time of the devices In phase angle control, extinction angle control, and symmetrical angle schemes, the supply current consists of one pulse per half-cycle and the lowest order harmonic is the third. It is very difficult to filter out the lowest order harmonic current. The lowest order harmonics can be eliminated and/or reduced if the supply current has more than one pulse per half cycle. The pulse-width modulation scheme is shown in the figure stated below.

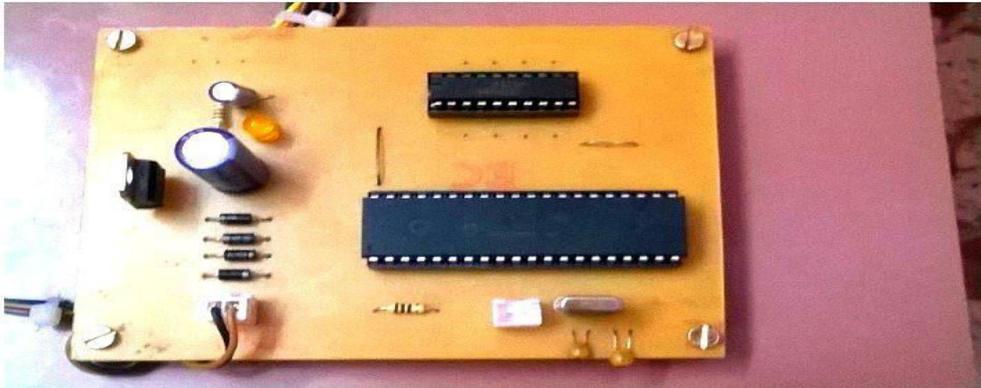


SOFTWARE REQUIREMENT

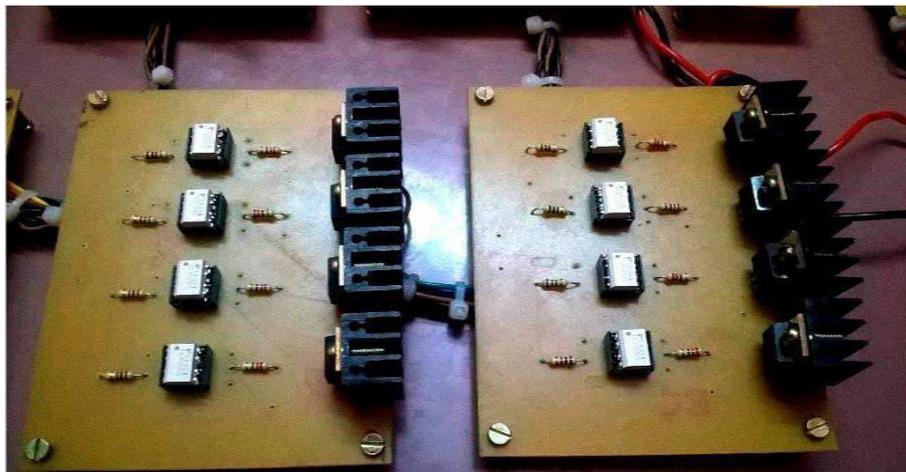
An important characteristic underlying the design of image processing systems is the significant level of testing and instrumentation that normally is required before arriving at an acceptable solution. This characteristic implies that the ability to formulate approaches and quickly prototype candidate solutions generally plays a major role in reducing the cost and time required to arrive at a viable system implementation. MATLAB is a high performance

language for technical computing. It integrates computation, visualization, and programming in an easy to use environment where problems and solutions are expressed in familiar mathematical notation. MATLAB is an interactive system whose basic data element is an array that does not require dimensioning. This allows one to solve many technical computing problems, especially does with matrix and vector formulation in a fraction of the time it would take to write program in a scalar non-interactive language such as C or FORTRAN. The name MATLAB stands Matrix Laboratory. MATLAB has evolved over a period of time with input from many users. In Industry MATLAB is the tool of choice for high productive research, Development and Analysis. MATLAB features of a family of application specific solutions called Tool Boxes. Tool Boxes are comprehensive collections of MATLAB functions (M-Files) that extend the MATLAB environment to solve particular classes of problems. Areas in which tool boxes are available include Signals Processing, Control Systems, Neural Networks, Fuzzy Logic, Wavelets, Simulation and Many more technical professional world rely widely on MATLAB to accelerate research, compact the time invested in analysis and development, reduce the project cost and produce effective solutions. The MATLAB environments encourage creativity and enables us to quickly test and compare multiple alternatives as the result we produce better solutions. Users are found there a combination of the intuitive MATLAB interface, Language and the built in math and graphics functions make MATLAB the preferred platform for technical computing compare to C, FORTRAN other languages and applications. One can quickly access and import data from instruments, files and external routines written in C, C++, FORTRAN and JAVA with the MATLAB applications. It supports system-level design, simulation, automatic code generation, and continuous test and verification of embedded systems.

The Programmable Interrupt Controller (PIC) is used to provide proper gate pulses to the eight different MOSFETs used at proper time intervals. Proper switching of the MOSFETs ensures obtaining proper sinusoidal waveform. The PIC is programmed to properly switch the MOSFETs.

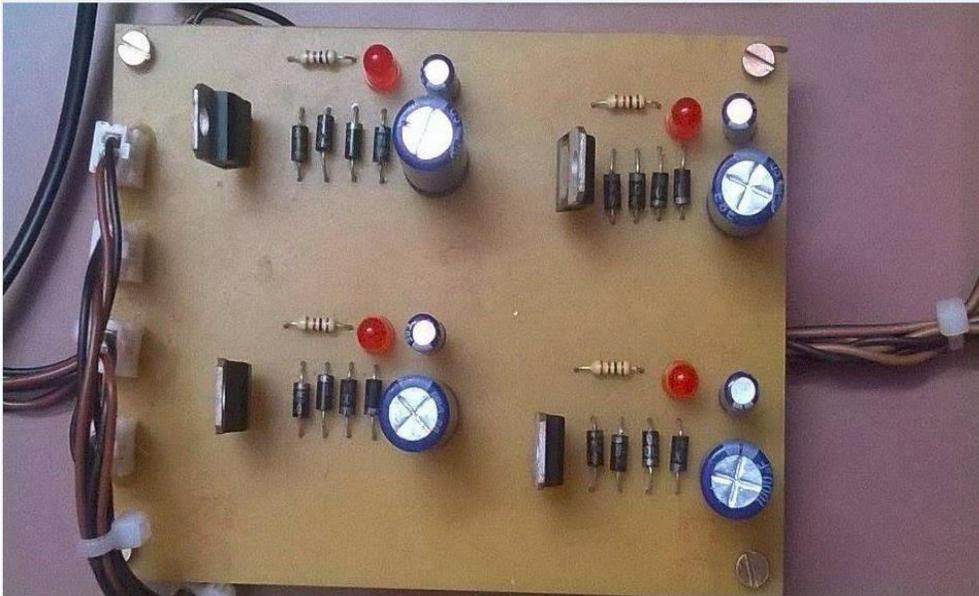


The IRF-840 provides fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220 package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 watts. The low thermal



resistance and low package cost of the TO-220 contribute to its wide acceptance throughout the industry.

The MC78XX/LM78XX/MC78XXA series of three terminal positive regulators are available in the TO- 220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.



- This stage converts the rectified DC into AC using a power oscillator. The power oscillator has a small output transformer with a few windings at the frequency 20-100 kHz. Switching is controlled by a MOSFET amplifier. The output AC voltage is usually isolated optically from the input AC by using an Optocoupler IC for safety reasons. A switch is an electrical component that can break an electrical circuit, interrupting the current or diverting it from one conductor to another. the mechanism of a switch may be operated directly by a human operator to control a circuit (for example, a light switch or a keyboard button), may be operated by a moving object such as a door-operated switch, or may be operated by some sensing element for pressure, temperature or flow. A relay is a switch that is operated by electricity. Switches are made to handle a wide range of voltages and currents; very large switches may be used to isolate high-voltage circuits in electrical substations.

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit.

Relays were used extensively in telephone exchanges and early computers to perform logical operations. Light is electromagnetic radiation within a certain portion of the electromagnetic spectrum. The word usually refers to visible light, which is visible to the human eye and is responsible for the sense of sight. Visible light is usually defined as having wavelengths in the range of 400– 700 nanometres (nm), or 4.00×10^{-11} to 7.00×10^{-11} m, between the infrared (with longer wavelengths) and the ultraviolet (with shorter wavelengths).

This wavelength means a frequency range of roughly 430–750 terahertz (THz). The main source

of light on Earth is the Sun. Sunlight provides the energy that green plants use to create sugars mostly in the form of starches, which release energy into the living things that digest them. This process of photosynthesis provides virtually all the energy used by living things. Historically, another important source of light for humans has been fire, from ancient campfires to modern kerosene lamps. With the development of electric lights & power systems, electric lighting has effectively replaced firelight.

Some species of animals generate their own light, a process called bioluminescence. For example, fireflies use light to locate mates, and vampire squids use it to hide themselves from prey. A wet cell battery has a liquid electrolyte. Other names are flooded cell, since the liquid covers all internal parts, or vented cell, since gases produced during operation can escape to the air. Wet cells were a precursor to dry cells and are commonly used as a learning tool for electrochemistry. They can be built with common laboratory supplies, such as beakers, for demonstrations of how electrochemical cells work. A particular type of wet cell known as a concentration cell is important in understanding corrosion.

2.CONCLUSION

The Seebeck effect-based thermoelectric power source using TEC module has been presented in this paper. One great advantage of the designed concept is that the TEC energy harvester can be employed to recover waste heat in industries that use compressors as large units as a renewable energy source and green technology. Experimental results confirm that the designed SEPIC converter is able to produce the desired output voltage for powering other electronic circuit. Another DC-DC boost converter can be added to the designed one if higher output voltage is required. Thereby the proposed concept allows energy conservation by saving the electricity used in industries providing an alternate source that is obtained from the waste heat.

3.REFERENCES

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