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ENERGY GENERATION AND SAVING USING NON-CONVENTIONAL ENERGY SOURCE

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Abstract - *Over the past decade, our lives have been more affected and improved by technology than in the entirety of the last century, this is because of vast applications and technologies available today. However the increase in such technologies also means, more energy is required for satisfying this demand. Hence it is essential to generate and use energy in an efficient way. So we have designed a model which will be generating energy using a non-conventional energy source and saving it later. Our model uses solar energy as non-conventional energy source and consists of methods to generate electricity and using it efficiently. With the help of this system, various appliances can be controlled for energy saving.*

Key Words: **Battery, Microcontroller, Inverter Circuit, Sensors, Solar Energy, Timer.**

1. INTRODUCTION

As new technologies are being developed rapidly, the use both renewable and non-conventional sources of energy such as solar energy is gaining large amount of popularity. The reason being green energy is more efficient and safer than any other usable power sources.

This is the reason which makes solar energy so eco-friendly, and besides that it will save you lots of money. Solar power is a sustainable source of 100 per cent renewable energy. As we make continuous progress more and more plant and animal species are expected to be lost in the coming years. Solar energy, by comparison, generates no emissions. The sun provides a large supply of energy that is not at all harmful to the ozone layer and cannot destroy it in any possible way. We have to reduce our reliance on oil, coal, and natural gas for the purpose of producing electricity. As we know emissions from such fossil fuels are very harmful and toxic in nature. This might affect the quality of air, water and soil and become a root cause for global warming.

We aim to implement a system which will produce electricity from solar energy by using a solar panel. This will make the system independent of other energy sources and in turn reduce the electricity bills. Energy saving will be done using timer and sensor. Sensors are used to identify a single person's presence; the lights will glow till the sensor senses human presence. The timer is used to turn on and off the fans for a specified period of time, saving about 50 percent of the energy used as opposed to the actual energy.

2. LITERATURE SURVEY

There are some systems available, wherein people have tried to implement a similar kind of system they are as follows:

ln[1] Keskar Vinaya N. created a system for electricity generation using solar panel. This project consists of energy generation using solar tracking system. A LDR was used as a sensor for detecting intensity of light. Maximum intensity of light was obtained using motor to rotate solar panels. Battery was charged in day time using charging unit. Microcontroller was used to control entire operation. A relay was used for the output circuit of the system.

ln[2] Mohd Rizwan Sirajuddin Shaikh, Santosh B. Waghmare, Suvarna Shankar Labade, Pooja Vittal Fuke, Anil Tekale in a review paper analyzed Sunlight Solar Energy and explored its future developments and aspects. The article also gave a brief about different forms of solar panels. It also discussed the different applications and approaches available so as to promote the use of solar energy. The working of the solar panels was also described.

ln[3] Mr.Deshmukh P.R. and Mr.Kolkure V.S. used PSoC (Programmable System on Chip) microcontroller and photovoltaic technology for generating and saving it. Wherein PSoC microcontroller act as Maximum Power Point Tracking controller and also reduces additional circuit requirements by controlling both the analog as well as digital circuits. This system also focuses on matching the impedance of Photovoltaic system by making adjustments in response to the changes in the climatic conditions.

3. OVERVIEW OF PROPOSED SYSTEM

Problem statement

To develop a system for Energy Generation and saving, that uses non-conventional energy i.e. solar energy. The system will consist of self-developed microcontroller circuit to control entire operation of the system thereby

reducing the manufacturing cost. Energy saving will be done using timer and sensor.

Hardware Requirements

- ATMEGA328 microcontroller IC.
- Solar panel.
- Passive Infrared Sensor.
- CD 4047 for Inverter Circuit.
- Relay Module.
- 16*4 LCD.
- MOSFET INR547

Software Requirements

- Arduino IDE for programming.
- Proteus Software for circuit Designing and Express PCB for PCB designing.

Design Details

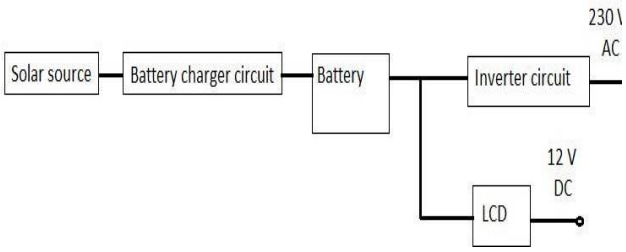


Fig 1.1 ***Block Diagram of Generator Circuit***

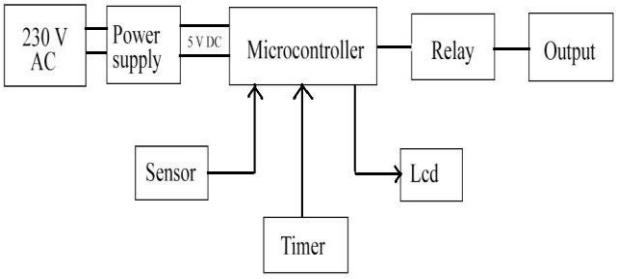


Fig 1.2 ***Block Diagram of Saver Circuit***

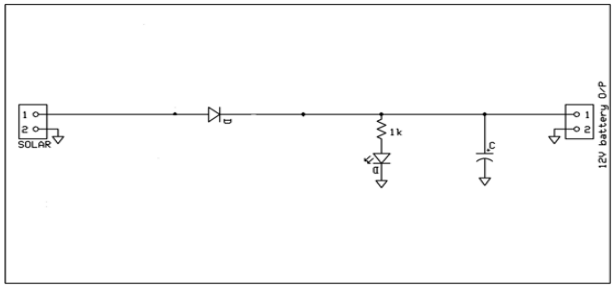


Fig 1.3 ***Battery Charging Circuit***

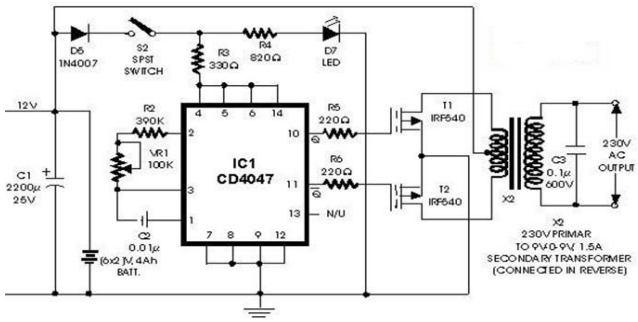


Fig 1.4 ***Inverter Circuit***

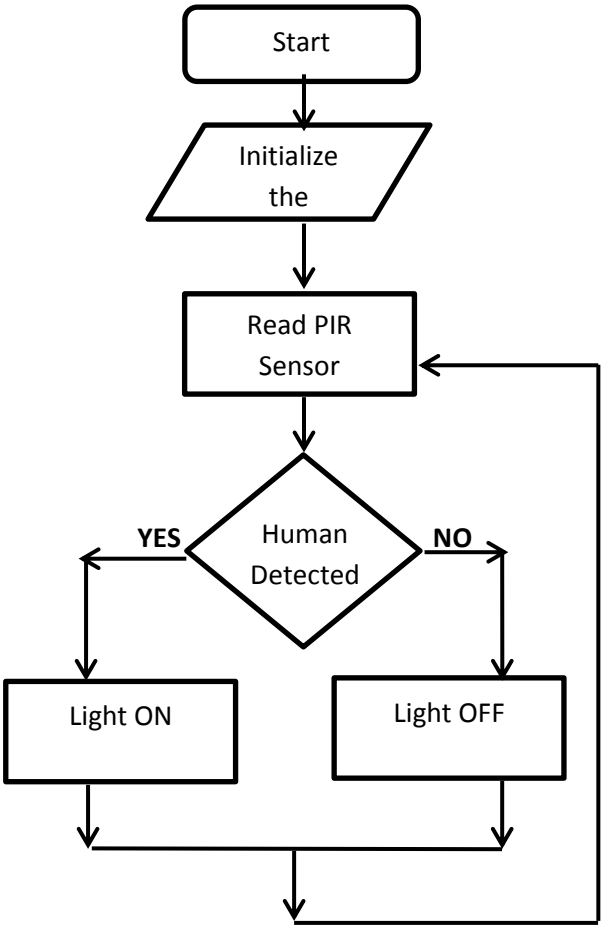
4. WORKING

Power generation will be done by using the energy generator unit as shown in Fig 1.1 with solar energy being the source. We are going to save energy by using energy saving unit as shown in Fig 1.2 which consist of timer and sensor. The output of the solar panel is in DC which can be converted into AC by using inverter. The dc output (12v) will be stored in the battery using battery charging circuit as shown in Fig 1.3. While connecting the solar panel to the battery the negative terminals of battery and solar panel will be connected normally, for the positive terminal there will be an additional diode connected between the battery and the solar panel to prevent the reverse flow of current. An indicator is used here to check if the battery is charging. The dc output from the battery can be connected to dc load if required for application. We need to connect AC load for our application, so we use an inerter which will give us 230v AC.

The inverter circuit as shown in Fig 1.4 consists of a center tapped step-up transformer, IC CD4047. The primary side of the transformer will have 12-0-12 v input from the battery. Output on the secondary side of the transformer will be 230V AC. On the primary side of the transformer there are two switches on either side of the battery forming two loops. When switch S1 in loop1 is closed the current will flow in anticlockwise direction, the voltage formed in the second loop will be due the mutual inductance. We get a negative half cycle of 230V on the secondary side. After some time the S1 is open and the S2 in loop2 is closed, the current in the second loop will flow in clockwise direction. Voltage formed in loop1 will be due to mutual inductance. We will get a positive half cycle of 230V on the secondary side of the transformer. As the polarity is changing it is alternating, so it is an AC output. These switching cannot be done manually, so we use electronic switches. There are two types of switches transistors and FET. Transistors are current operating device whereas FET are voltage operating device. For our application we will use FET, its input impedance is infinite and output impedance is low as it has proper isolation. As we need alternate output we will use flip-flop circuit, this flip-flop will be connected to those switches we discussed

earlier. As they are n-channel they will be active high. CD4047 is a normal T flip-flop but it has free running clock, for giving a clock to cd4047 we need to connect a resistor and a capacitor. It has a frequency of 50HZ.

5. FLOWCHART



6. ADVANTAGES

- Reduction in manufacturing cost.
- Independent of other energy source other than solar energy.
- Highly useful for energy generation in remote location.
- After implementation maintenance of this system is very low.
- This type of system can be used in various applications such as street light control to save energy.

7. CONCLUSION

In this project work, we were able to develop a control system which is smart and energy efficient. Our system provides an innovative technology that provides a way to utilization of energy in efficient way so as to reduce the energy usage and helps to reduce ones bill. A more intelligent system is required to be embedded for monitoring and controlling the power resources as per the requirement, providing a user friendly environment. It includes a feedback system. Unlike traditional system, wherein there is no feedback to specify when and how much energy is required. In this thesis work, we have designed an Energy Saver using PIR sensor which senses the present situation, as soon as it detects a human being it transmits the information to the Micro controller regarding the current status. It takes an intelligent decision to control the corresponding devices of the room which it is mounted in. If the sensor does not sense a presence of a human it will take a decision to turn OFF. We have also used a timer circuit, which is programed to run for a certain time and then turn off for some time. This will save up to 50% of the energy. We used solar panel in order to generate power which can be used in household appliances.

REFERENCES

1. Keskar Vinaya N. "Energy Generation Using Solar Power", Vol. 2 Issue 2, February- 2013, International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181.

2. Mohd Rizwan Sirajuddin Shaikh, Santosh B. Waghmare, Suvarna Shankar Labade, Pooja Vittal Fuke, Anil Tekale "A Review Paper on Energy Generation from Solar Energy", *Volume 5 Issue IX, September 2017,* International Journal for Research in Applied Science & Engineering Technology (IJRASET**),** *ISSN: 2321-9653.*

3. Mr.Deshmukh P.R. and Mr.Kolkure V.S. "Self-Electricity Generation and Energy Saving By Solar Using Programmable System on Chip (PSOC)",Vol. 4 Issue 2 , 2014, The International Journal of Engineering And Science (IJES), ISSN: 2319 – 1813

4. "Op-Amp & L. I. C." By R. A. Gayakwad.