

A Review: Power generation using rural cooking Method

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Abstract: The system is dealing with the generation of electricity from low temperature domestic excess heat. Excess of heat energy from cooking at rural houses can be used for generation of electrical energy. Since burning wooden logs are the method used in many rural areas for cooking food where LPG and Electricity connections are not available. There are a lot of excess heat energy wasted due to this method of cooking. This heat energy can be used to rotate rotor of Stirling engine which will be connected to a dynamo. The dynamo results in generation of current. This current can be stored in a battery and can be used later. This may even work if LPG gases are used for cooking. Apart from that, solar panel is also used which will be providing electrical energy to the battery. So the battery is receiving energy from two different sources. This will result in betterment.

Keywords: Electricity generation, Excess heat, Heat recovery

I. INTRODUCTION

Awareness of climate change and the threat of rising energy prices have resulted in increased attention being paid to energy issues. However, this option has not been fully investigated. Now-a-days, there are lot of load shedding going on in many areas in India. Apart from that rising price of electricity is also a problem. This is because, of shortage of energy in India.

The idea shared in this paper may contribute a bit for the solution to the rising problems faced. Here in our country. Here, the paper is discussing about a method by which electricity can be generated at home itself and use it for home appliances. Which means any house can be independent in using their electrical home appliances. This paper may not help any house to generate so much of electricity that it can even operate heavy power consuming electrical devices. But it will definitely show how to generate electricity for atleast basic electrical appliances which does not come under the category of heavy power consuming devices.

The paper deals with generation of current by 2 methods. The idea of First method came from the mechanism of headlight used in cycle. A cycle doesn't have a battery on any complicated circuitry for charging. Still its headlight which is an electrical device works. This is because of usage of dynamo. If one will use the same principle in our day to day life also, Its going to be a revolution. It is a topic to be thought. This paper is an outcome of the thought process related to this idea. Here the system is also integrated with solar panel in addition to the dynamo concept. This will result in more power generation.

II. BLOCK DIAGRAM

The system is having a cook-top here which has flame. Flame is necessary for functioning of Stirling engine. The rotor of Stirling engine will be connected to a dynamo

and coupled with it so that dynamo gear may rotate with the same speed of Stirling engine rotor. this will result in generation of DC current.

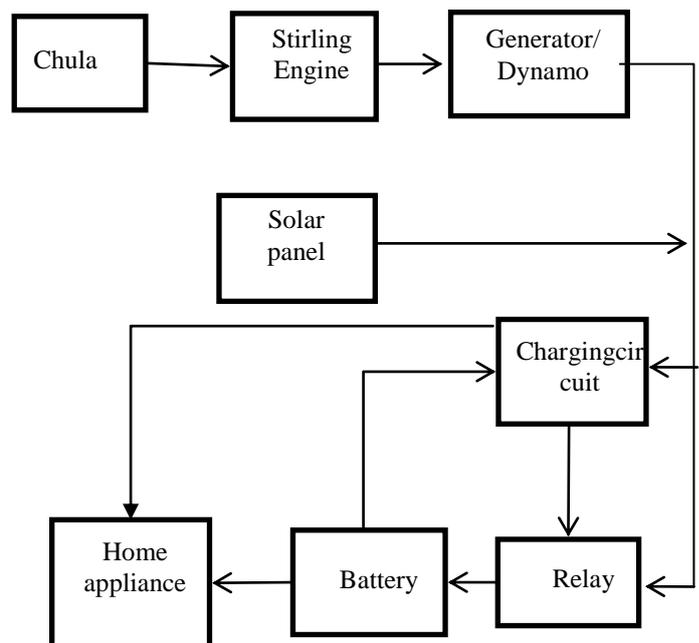


Fig. 1. Block diagram of the system

The system also has a scope for one more source for current generation. Its solar panel. system is using a photo transistor for this purpose.

The charging circuit first checks whether the battery is full or not. If the battery is full, the current coming from Stirling engine or solar panel will be directed towards the home appliance directly so that the appliance will start functioning. This happens only if the button is ON. If the battery is not full, then the battery will start charging due

to the current coming from generator and solar panel. And when the button status on ON, then the current will be drawn from the battery to function the home appliance.

III.FLOW CHART

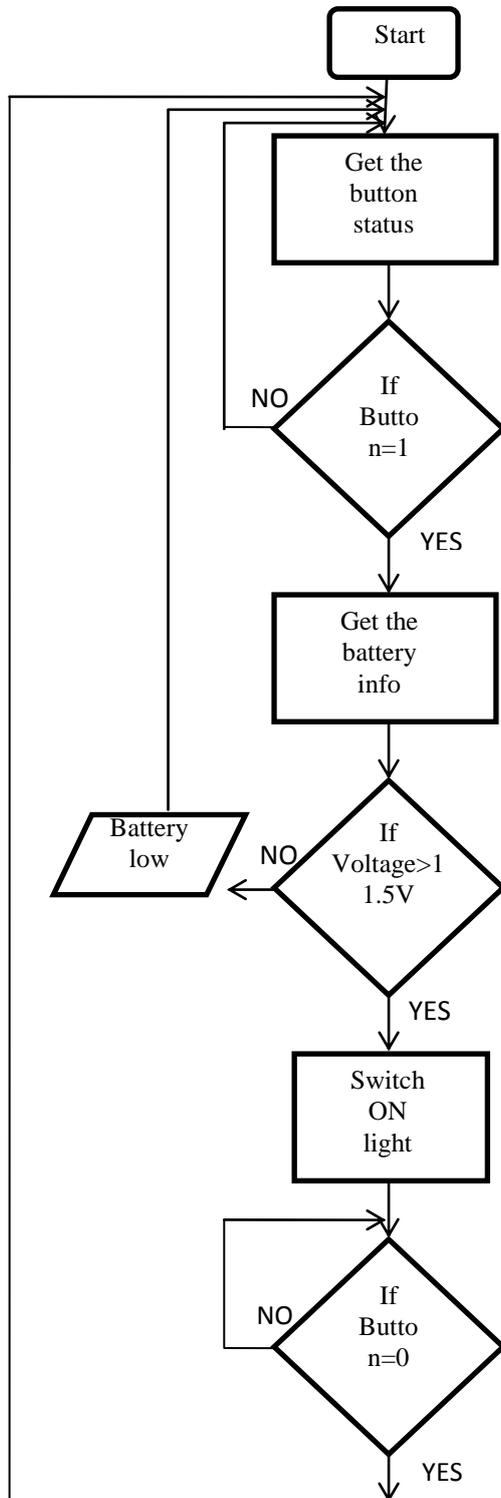


Fig. 2. Light switch flowchart

The flowchart says that if anyone tries to switch ON the home appliance, by pressing the button, then first of all battery status will be checked where the controller will

come to know whether the battery is having sufficient electric current stored in it so as to operate the device. If the battery is having enough amount of charge in it, then the home appliance is switched ON. If battery does not have sufficient amount of charge in it, then the home appliance will not be switched ON. Instead battery will indicate about low battery information. And if we try to switch off the home appliance by pressing the button, then the device gets switched OFF.

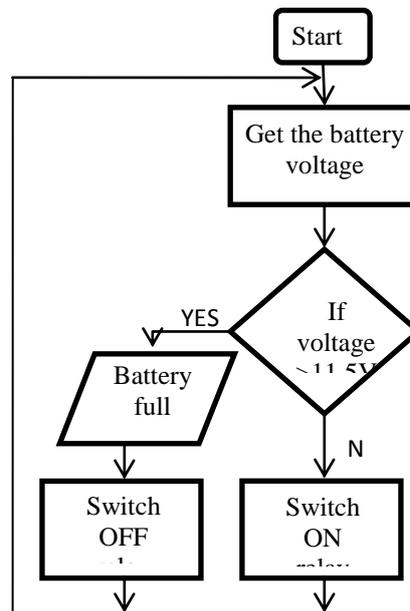


Fig. 3. Battery charging flowchart

This flowchart explains the flow of battery charging circuit which decide when to charge the battery and when not to charge it. This flowchart will prevent over charging of the battery.

Here, the battery voltage is continuously checked. If the voltage >11.5V, it indicates that the battery is full. Therefore the relay switches the charging circuit off. But if the voltage >11.5V, then the relay switches on the charging circuit. And therefore the battery charges.

IV.SYSTEM IMPLEMENTATION

The system consist of two parts mainly. One generates electrical energy from fire to store in the battery. Stirling engine connected to a dynamo is used for this purpose. Whereas the other one is a simple solar panel setup which generates electric current from solar energy.

The components which are mainly used in the proposed system are as follows :

A. Home appliance

System can be implemented by using any home appliance. But for time being, the paper deals with a system having a 5W LED bulb as a home appliance.

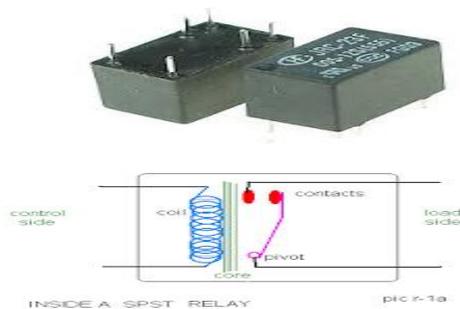
B. Dynamo

It is an electrical generator which generates electricity with the help of a commutator. It generates DC current.

Here system will be using a 12V 6W neo magnetic dynamo for generating electricity. Neodymium magnets can be used in the motor which are rare earth magnets. They are most powerful magnets. They will help us to induce more energy into the coils. Another magnet is used for levitation purpose between neo and coils i.e. mid magnet having inner diameter 6", outer diameter 2" and thickness 1.5". Winding gauge will be 12 to 15 and 3 inches diameter. Maintaining air gap 5mm to 10mm.

C. Relay

It is a digital relay which has 1pin for interface. This can be used to ON or OFF the circuit. TYPE: Electromagnetic/Electromechanical Relay



(a) , (b)

Fig. 4. (a) Relay and (b) Working circuitry

D. Stirling engine

It is a heat engine which consists of a hot side heat exchanger and a cold side heat exchanger and a displacer which moves or displaces the gas which is working fluid from hot to cold heat exchanger. It also has a fly wheel connected. This fly wheel is a very large wheel which is connected to pistons of engine which adds to the momentum of the machine and helps in the completion of sterling cycle.

E. Solar panel

System is also using a solar panel here for generating more amount of current. Fig. 5 shows the charging circuit. It is a 12V solar panel along with a variable regulator IC LM317. The charging current passes through diode D1 to the voltage regulator IC LM317. And by adjusting its pin, output voltage and current can be regulated. 6V and 4.5 Ah battery is used for this circuitry.

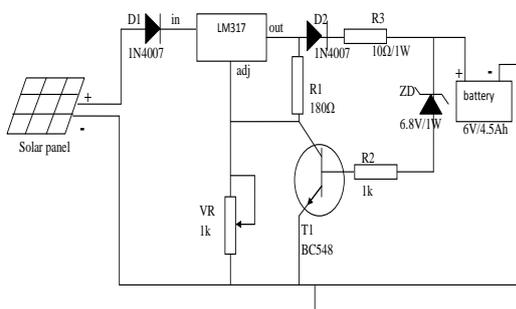


Fig. 5. Charging circuit

V. ADVANTAGES AND APPLICATION

The major application of this product is using it in house for working home appliances. This can majorly be used in rural areas where electricity connection may not be feasible. Even if the electricity connection is available, still we can use this system which may result finally in saving electrical energy which is currently available in limited. Commercialization of this product may also be a useful thing for public benefit.

VI. CONCLUSION AND DISCUSSION

This system can be helpful to find a permanent solution for problem faced by rural areas where electricity is not available or affordable. I have found an alternative to convert heat energy from cooking stove into electrical energy. This will enlighten houses during night time which doesn't have electricity connection. I hope this paper will help us to deal with shortage of electricity faced widely in India. Using this product domestically should be promoted in our country.

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