

Hybrid Power Generation with Stand Alone System

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ABSTRACT

A hybrid power generation with stand alone system is concept about to provide continuous uninterrupted power supply with the various source of energy. The demand for electricity is increase day by day. Power cuts causes many problems. As high-tech society requirement of expected power supply that is high in quality, reliability and availability. With the advancement in power, the key in power system is to avoid power interruptions. The power distribution in rural areas by developing an off-grid which uses various form of energy.

Keywords: 8051Microcontroller, Rectifier, Driver ICs, Transformer

I. INTRODUCTION

A hybrid power generation with stand alone system is concept about to provide continuous uninterrupted power supply with the various source of energy. The demand for electricity is increase day by day. Power cuts cause many problems. As high-tech society requirement of expected power supply that is high in quality, reliability and availability.

With the advancement in power, the key in power system is to avoid power interruptions. The power distribution in rural areas by developing an off-grid which uses various form of energy. The system is used for the commercial buildings, hospitals, industries where they can afford this system. The power supply to a load by selecting the supply from any sources such as mains, generator, inverter and solar.

II. SYSTEM TOPOLOGY

1. Block diagram

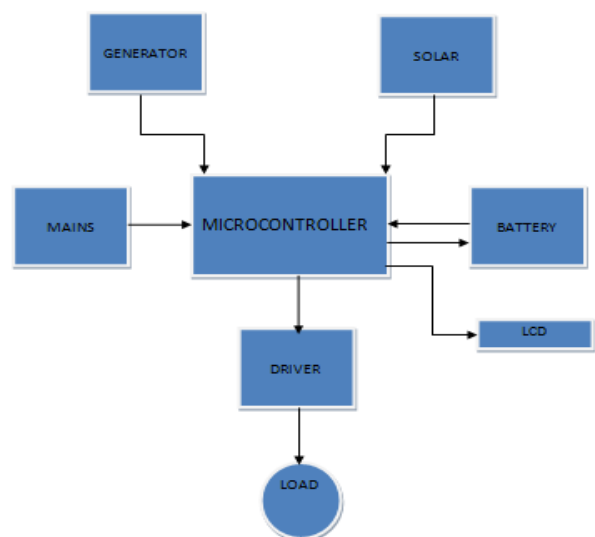


Figure1. Block Diagram

2. Voltage transformer

1] Transformers convert AC electricity from one voltage to another with a little loss of power. Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high voltage to a safer low voltage.



Figure 2.Transformer

The ratio of the number of turns on each coil, called the turn's ratio, determines the ratio of the voltages. A step-down transformer has a large number of turns on its primary (input) coil which is connected to the high voltage mains supply, and a small number of turns on its secondary (output) coil to give a low output voltage.

3. Rectifier

A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), current that flows in only one direction, a process known as rectification. Rectifiers have many uses including as components of power supplies and as detectors of radio signals. Rectifiers may be made of solid state diodes, vacuum tube diodes, mercury arc valves, and other components. The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C.

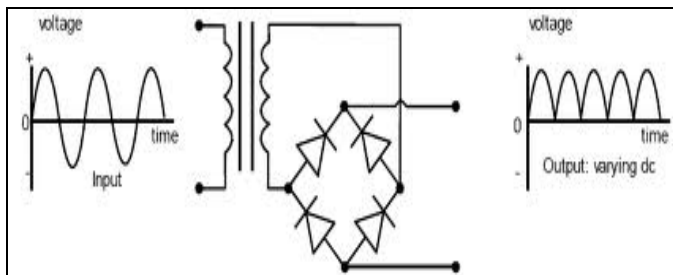
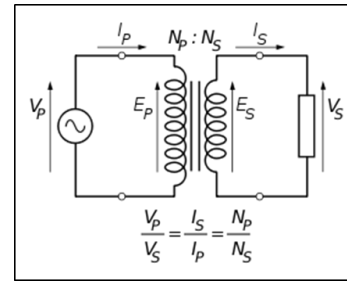


Figure 3. Rectifier

The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification. In positive half cycle only two diodes will conduct, in negative half cycle remaining two diodes will conduct and they conduct only in forward bias only.

4. Ideal power equation



Where,

V_p = Primary (input) voltage.

V_s = Secondary (output) voltage

N_p = Number of turns on primary coil

N_s = Number of turns on secondary coil

I_p = Primary (input) current

I_s = Secondary (output) current.

The ideal transformer as a circuit element if the secondary coil is attached to a load that allows current to flow, electrical power is transmitted from the primary circuit to the secondary circuit. Ideally, the transformer is perfectly efficient; all the incoming energy is transformed from the primary circuit to the magnetic field and into the secondary circuit. If this condition is met, the incoming electric power must equal the outgoing power:

$$P_{\text{incoming}} = I_p V_p = P_{\text{outgoing}} = I_s V_s$$



Figure 4. Hardware Model

III. RESULT ANALYSIS

Hardware Implementation:

The output of microcontroller is given to the relay driver IC which switch appropriate relay to maintain uninterrupted supply to the load.

IV. CONCLUSION

In this project we designed the hardware base model in such way that if the power is cut off or not reachable in remote areas where attempt to improving the power distribution capacity in rural areas by developing an off grid portable backup or return power feeding which uses various forms of renewable energy. The various forms of energy used in this project are solar, wind, grid, battery and DG with their availability and priority.

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