



Multipower Generation

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Abstract:

In parallel to developing technology, demand for more energy makes us seek new energy sources. The most important application field of this search is renewable energy resources. Wind and solar energy have being popular ones owing to abundant, ease of availability and convertibility to the electric energy. This work covers realization of a hybrid renewable energy system for a domestic application, which runs under a microcontroller to utilize the solar and wind power and pedal power. If electricity is available through the AC mains then this can be used to charge the battery. This project is implemented in accordance with available line electricity. Batteries in the system are charged by either wind power via a small alternator or solar power. Power resources and loads in the system are monitored and controlled in real time.

Keywords: Solar Energy, Wind Energy, Pedal Power, Inverter**I. INTRODUCTION**

India is a large country and the rate of electrification has not kept pace with the expanding population, urbanization and industrialization and has resulted in the increasing deficit between demand and supply of electricity. This has not only resulted in under electrification but also put heavy pressure on the governments to keep pace with demand for electricity. People not served by the power grid have to rely on fossil fuels like kerosene and diesel for their energy needs and also incur heavy recurring expenditure for the poor people in rural areas. Wherever the rural areas have been brought under power grid the erratic and unreliable power supply has not helped the farmers and the need for an uninterrupted power supply especially during the critical farming period has been a major area of concern.

1.1 Solar Power:

India receives a solar energy equivalent of 5,000 trillion kWh/year with a daily average solar energy incidence of 4-7 kWh/m².

This is considerably more than the total energy consumption of the country. Further, most parts of the country, experience 250-300 sunny days in a year, which makes solar energy a viable option in these areas. It could provide the solution to the rural energy problem, particularly in remote areas where grid extension is not a viable proposition. Solar energy, with its virtually infinite potential and free availability, represents a non polluting and inexhaustible energy source which can be developed to meet the energy needs of mankind in a major way. The high cost, fast depleting fossil fuels and the public concern about the eco-friendly power generation of power have led to a surge of interest in the utilization of solar energy.

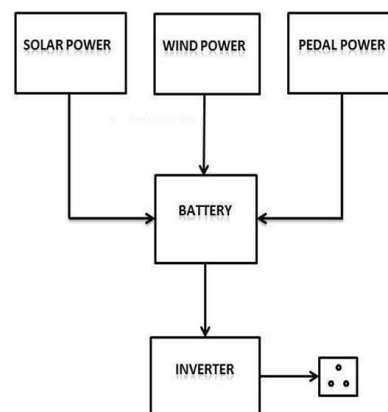
1.2 Wind Energy:

The development of wind power in India began in the 1990s, and has significantly increased in the last few years. Although a relative newcomer to the wind industry compared with Denmark or the United States, India has the fifth largest installed wind power capacity in the world. In 2009-10 India's growth rate was highest among the other top four countries. As of 31 Jan 2013 the installed capacity of wind power in India was 18634.9MW, mainly spread across Tamil Nadu, Gujarat, Rajasthan, Maharashtra and Kamataka. It is estimated that 6,000 MW of

additional wind power capacity will be installed in India by 2012. Wind power accounts for 6% of India's total installed power capacity, and it generates 1.6% of the country's power.

1.3 Pedal Power:

In remote areas, hilly regions, strategic location, border areas (army deployment), Islands etc. generation of power is scanty if not nil. In these situations a Small Manual Battery Charging Unit would be of great help to provide power supply to battery chargers or battery operated gadgets like mobile phone, communication devices, radio, lamp, fan, TV etc. This product was conceived while studying various means to charge the batteries of an energy efficient lamp. The present design relates to very compact and easily portable power-generating unit, which besides being used as a power generator can also be used as cycle exerciser. The power-generating unit is pedal operated. It serves dual purpose of power generation and helping the person to maintain physical fitness through exercise of muscles of legs and lower torso. The force applied to the pedals gets transmitted to the rotor unit of power generating device through chain-sprocket and gear train. The sizes of sprockets and gears are so chosen to achieve suitable rotating speed of the rotor for power generation.

II. SYSTEM BLOCK DIAGRAM**Figure.1. system Block Diagram**

Need and Scope:

In rural areas where the electricity infrastructure is not up to the mark and even in places where the infrastructure is there, electricity is available for few hours only. Many projects have been made on the hybrid power systems. But all of them have mostly used only wind and solar power sources. Our project aims to overcome the drawback of the systems of the past. We have added a pedal power electricity generation to the hybrid power system. Our aim is to make a model that can be easily installed in any area of the world. The module should be portable.

III. CONSTRUCTIONAL FEATURES:

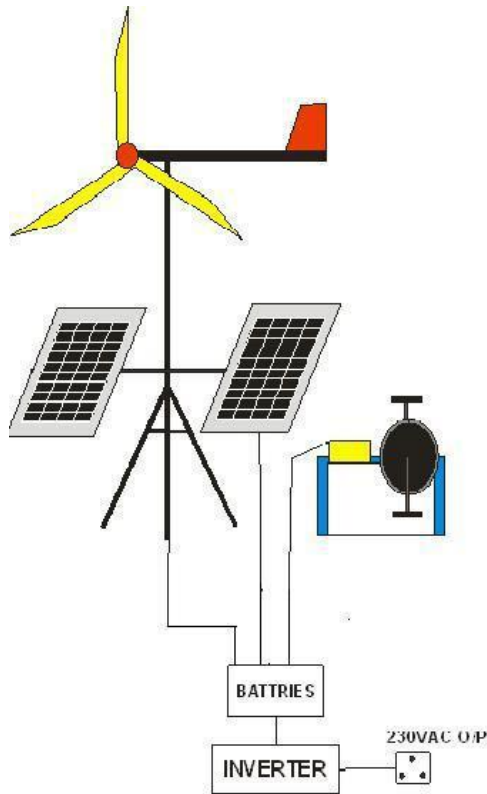


Figure.2. Constructional Diagram

This is the approximate design of the system. The wind turbines have been fitted on the top of the stand so as to achieve maximum exposure to wind. The solar panels have been fitted on the side of the stand. The entire system will not be more than a few meters tall. The generation of pedal power is in the ratio of 1:10, it means if we pedal for once the internal rotor machine will rotate 10 times. the material used in solar panel is silicon instead of amorphous, which overcome the limitation of dependence only on sunlight i.e. It can generate the electricity on luminance light itself .the inverter is used to convert ac to dc or vice versa. The setup of model is made in such a way that if any one fails to generate the electricity others can generate it.

Main Components:

1. Wind blades:

Blades are made of pvc pipes and having 3m of span to rotate. As the wind blows the blades will rotate and energy will be generated.

2. Solar Panels:

Here we have used 2 solar panels, which extract the heat from sun and convert it into useful energy to use further.

3. Pedals:

Pedals are used to produce power by simply pedaling .It is nothing but mechanical power generation .The ratio is kept 1:10 that clearly indicates , Motor connected to the pedals will rotate 10 times as we just pedal once . Hence it is a great source to generate a power when there is no sun or wind available

4. Battery:

A 12v battery we have used which will give output power upto 5v.All the power generated from 3 sources: Solar, Wind, Pedal, will be stored in battery for the best use.

5. Inverter:

It is the main component as it converts DC current from battery to useful AC current. Hence, with the help of all above components our system will generate the power.

IV. DESCRIPTION:

The solar power gives the output of 36watt, whereas wind power produces the output of 26watt at its best environment condition and pedal produces 28 of watt. It contains three red led and five green LEDs. Three red LEDs are used as an indication power is coming from the source, i.e., one red LED indicate power from solar energy, similarly the other two red led indicates power from wind energy and pedal energy. Now the five green led are used to define the condition of battery charging. First green led is float which describes that the battery is dead. Second indicates under charge, third indicates battery is charging, fourth indicates that the battery is charged, and the last indicates battery is overflow. Now we will use the inverter to convert the stored energy into AC from DC. Hence we can see the output in the AC load. the battery will be in charging state when the inverter switch is off but as soon as we turn on the inverter, current will flow from it and the bulb glows at the output.

V. APPLICATIONS AND FUTURE SCOPE:

Applications:

Used in Rural Areas and Remote places:

People not served by the power grid have to rely on fossil fuels like kerosene and diesel for their energy needs and also incur heavy recurring expenditure for the poor people in rural areas. Wherever the rural areas have been brought under power grid the erratic and unreliable power supply has not helped the farmers and the need for an uninterrupted power supply especially during the critical farming period has been a major area of concern. Used in Military Camps for charging Gadgets: Most of times the military camps are located far away from their base, and the time duration for them is also unpredictable, at such areas where electricity is not available their this module can used to generate energy.

Used in Mobile Medical Camps:

In rural areas, medical camps often face

Many problems because of load shedding it may affect human lives during emergencies. This problem and hence prove a boon to human life.

Future scope:

- It can be used as four wave power generator for future applications.
- It can be extended by one more power generating source i.e., Hydro power.
- The output of the project can be increased by using solar panel of more than 40 watt

VI. CONCLUSION

This high-efficiency 40 Watt solar model provides superior value and performance for a wide variety of applications. Use for industrial and rural electricity needs for directly operating DC loads, or use for battery charging to power DC lighting, radios, laptops, small television, short-term refrigeration and other appliance. Once the cut-in speed is achieved, my turbine performs as predicted for a typical home-made unit. During testing it produced on the order of 200W when wind speeds of 25 to 30 mph were obtained, and data confirmed the exponential relationship of power to wind speed. Terminal resistance of the stator unit is 5.8W. EMF constant of the power-generating unit is 20mV/rpm. The power generated at 1000RPM of rotor is 9Watt.

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