RESEARCH PAPER ON SOLAR-WIND HYBRID INVERTER

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ABSTRACT

The solar and wind hybrid energy system with battery storage and AC mains supply is presented in this paper. This setup allows the three energy sources to connect to the battery and supply the load independently or concurrently, depending on the energy sources' availability. In many rural areas of India, electricity has yet to reach their homes and many people are experiencing load shedding. This paper describes a hybrid concept for a battery charging system as well as its execution. Solar PV and wind energy, in addition to AC mains supply charging, charge the battery whenever they are available. This method offers a constant power supply and speedier battery charging. The system was created to fit a typical Indian scenario in which there is a power shortage, resulting in scheduled and unscheduled power outages. With the usage of traditional energy sources, the globe is progressing at a rapid pace nowadays. The two biggest drawbacks of using them are the pollution they cause the environment and their limited supply. Non-conventional sources of energy, on the other hand, non conventional sources are abundant, free of charge, and pollution-free. As a result, it is preferable to use non-conventional energy sources such as solar energy, wind energy, wave energy, biomass, and so on. This study discusses an energy conservation approach that combines two non-conventional energy sources, namely solar and wind energy.

1. INTRODUCTION

Almost all of the appliances we use in our daily lives require energy to operate. Electricity consumption is expanding quickly in tandem with population growth and technological improvement. Simultaneously, we must increase electricity output to fulfil the demands of an ever-increasing population. The most significant disadvantage of using traditional resources is that they pollute the environment by producing numerous pollutants such as ash in coal power plants, smoke in diesel power plants, and radioactive material in nuclear power plants. Maintaining these contaminants is a difficult task that costs a lot of money. As a result, we'll have to come up with new ways to generate electricity. The best way is to use non-conventional energy sources. Solar and wind power are the most efficient non-conventional energy sources. Solar energy availability is a key challenge, as it is only available for about 8 hours each day, whereas wind is available for practically 24 hours. But, by combining these two, we can compensate for that flaw. During bad weather, one of them can be used, while in good weather, both can be used. As a result, we'll describe a solar-wind hybrid power system in this study. The IMEON hybrid inverter, made in France by IMEON, is an example of a solar hybrid inverter incorporating artificial intelligence. A commercially available intelligent hybrid inverter system is the Pika Energy Island, which is made by Pika Energy.

2. METHODOLOGY

Because the peak operating times for each system occur at various times of the day and year, combining wind and solar has the advantage of complementing each other. The power generated by a hybrid system is more consistent and fluctuates less than the power generated by each of the two component subsystems.

2.1 Solar Energy

Solar energy is the energy that we receive in the form of radiation from the sun. It does not pollute the environment and is infinite. It is available for free. It is a convenient technique of electricity

production, especially in a country like India, where the sun shines for over 300 days a year. The system's efficiency is also quite high.

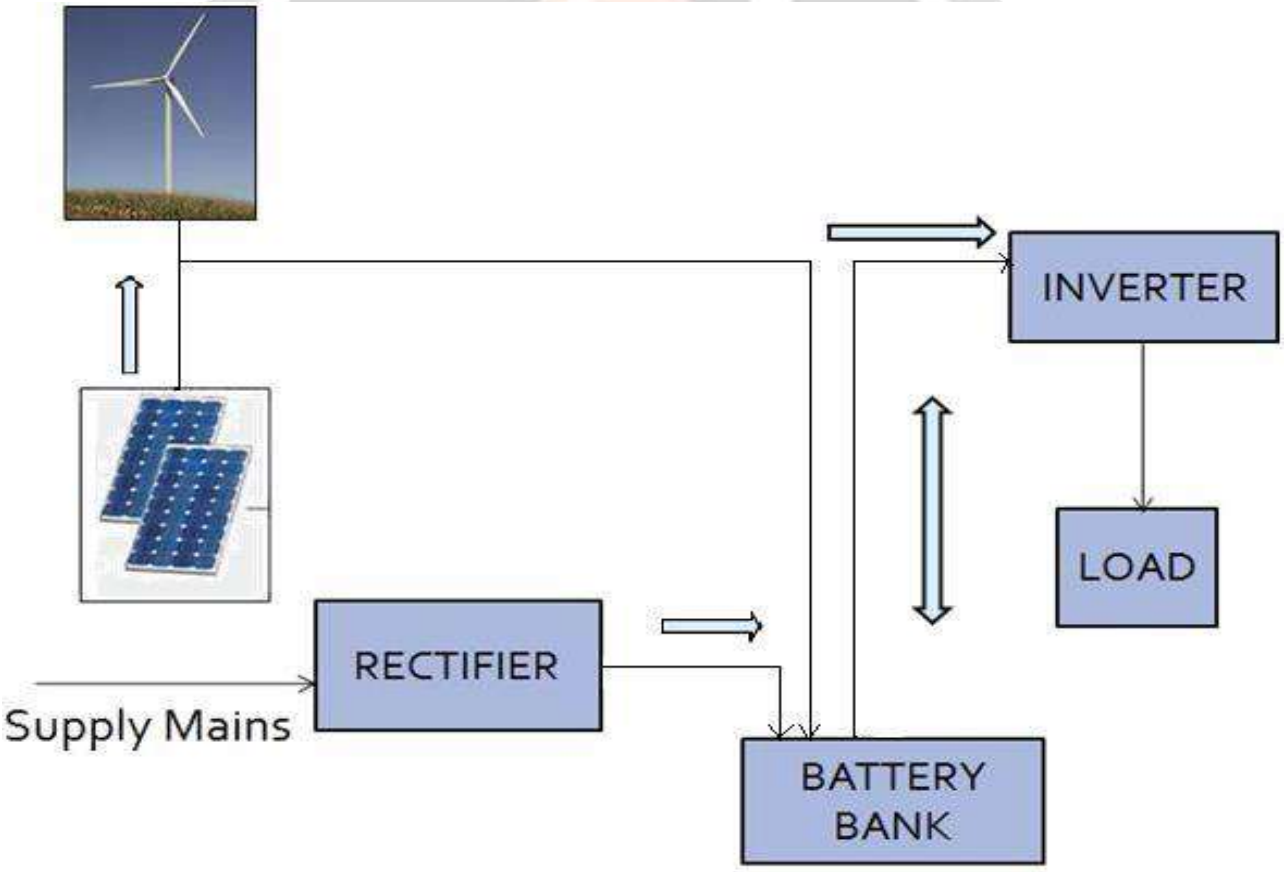
2.2 Wind Energy

When air flows, it carries kinetic energy, which is referred to as wind energy. The wind turbine converts this kinetic energy into mechanical energy, which is then used to move the generator shaft and generate power. The cost of producing electricity is very low. Depending on the type of turbine utilised, the system's initial investment varies. The production fluctuates depending on the wind speed.

2.3 Hybrid Systems

Hybrid systems are made up of solar panels and wind turbines, whose output is utilised to charge batteries, which can then be transmitted to local power plants. When there is enough wind, a wind turbine can be utilised to generate electricity, and when there is enough sunlight, solar energy panels can be employed. Both portions can generate power simultaneously. Batteries are used to ensure that electricity is available at all times. This technique necessitates a substantial initial outlay of funds. However, the reliability, long lifespan, and low maintenance requirements compensate for this shortcoming. The wind turbine produces AC power, which is rectified into DC.

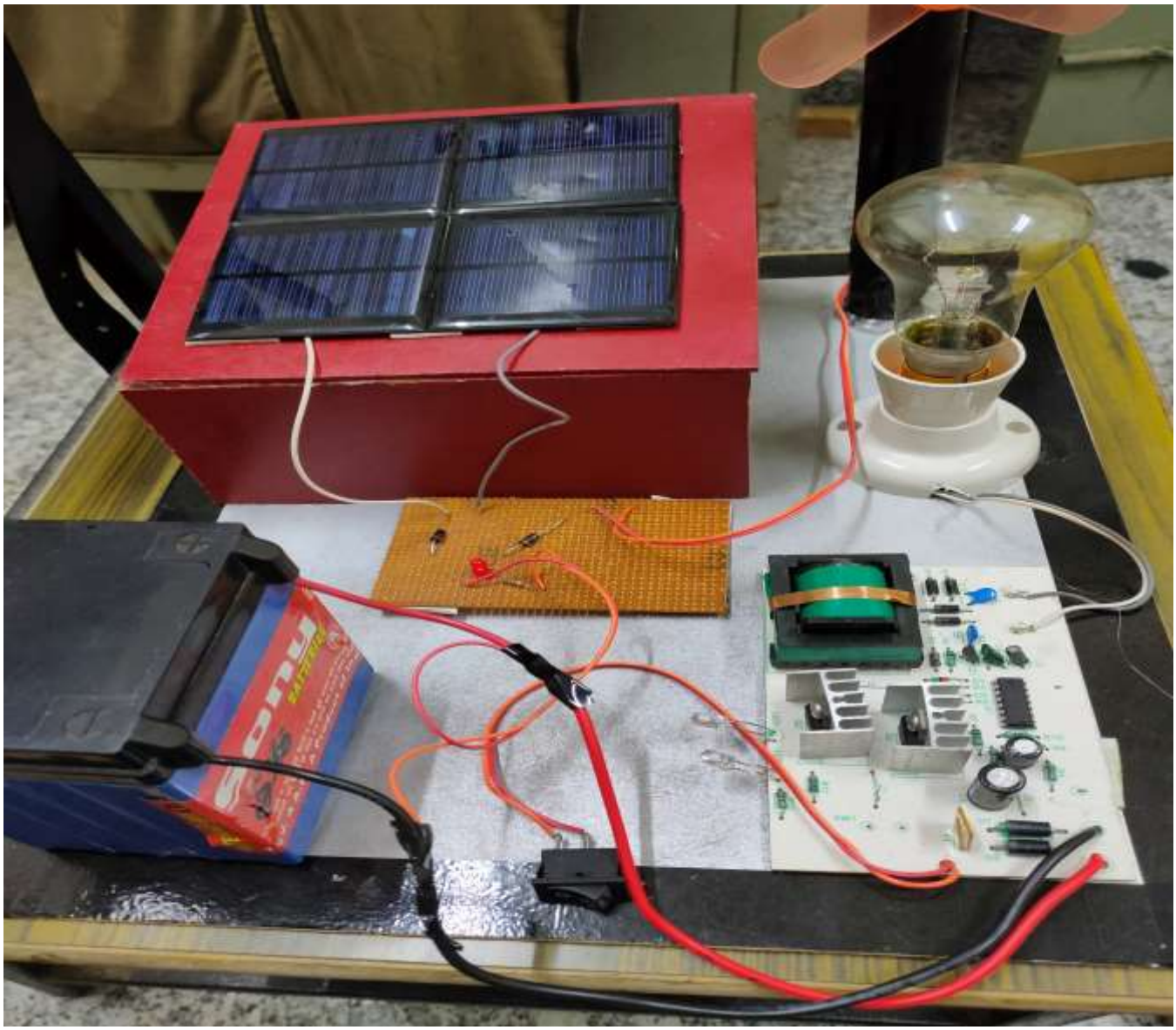
3. WORKING



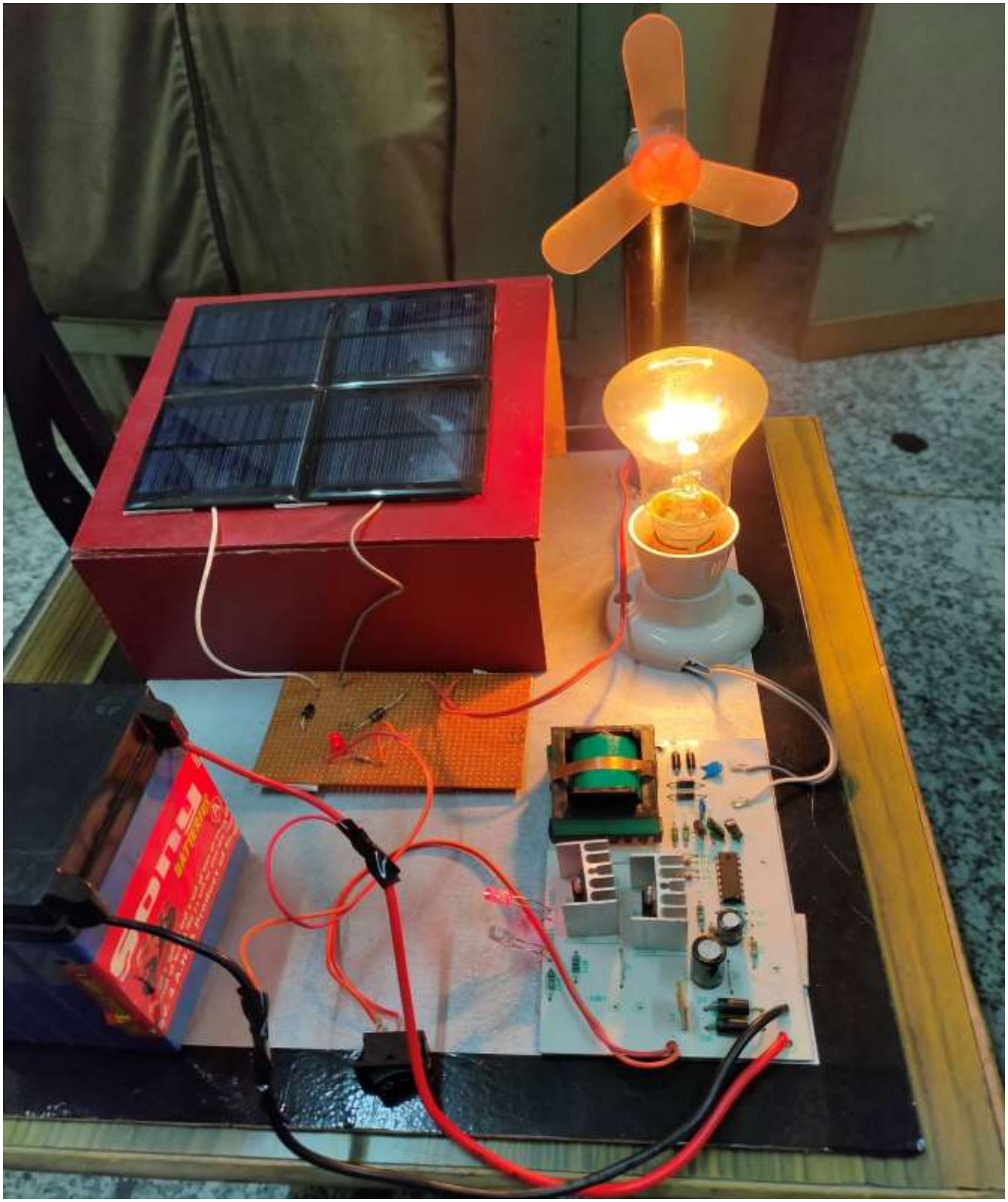
The schematic representation of the hybrid system

A battery bank is charged from three sources: a solar panel, a wind turbine, and an AC mains supply. Solar panels and wind turbines are the primary sources of charging, with AC mains power being an option. When charging is done with AC power, a rectifier is used to convert the AC to DC. During the day, while the sun is shining, the solar panel is utilised to capture solar energy and store it in the battery bank. When there is a strong wind, the wind mill can be used to capture the energy and charge the battery bank. During a power outage, the battery bank's stored energy can be used to load. This is accomplished by the use of an inverter, which converts the DC energy stored in the battery bank into AC power.

4. RESULTS AND DISCUSSION



This is how everything is set up. Solar panels are utilised during the day to capture solar energy, which is then used to charge the battery bank. An inverter is linked to the battery bank to convert the DC power stored in the battery to AC power, which can subsequently be used at the load. An electric bulb serves as the load in this demonstration model.



During power outages, the battery bank's stored energy is used to light the bulb.

5. CONCLUSION

Hybrid energy systems rely on two or more sources of energy for electrical generation, and are set up so that one or more of these sources can service the loads directly or indirectly. By utilising battery storage, a stable constant supply can be provided to loads even during power outages, ensuring protection against power outages as well as voltage management under undervoltage and overvoltage scenarios. These are most useful in areas where power interruptions are unavoidable. Computers that control essential processes, medical equipment, and laboratories, for example. Wind and solar hybrid energy systems provide a unique option to reduce a home's electric bills or, in some situations, totally disconnect from the grid. Hybrid systems address some of the drawbacks of using only one type of renewable energy by combining wind turbines and solar panels to create electricity and store it in batteries (i.e., the system may be more able to reliably generate electricity).

One of the project's main goals is to raise the standard of living in underdeveloped distant villages by boosting the use of alternative energy technology. This project serves as a benchmark for demonstrating the social, environmental, and economic benefits of such a technology. Our proposed project, the design of a HYBRID INVERTER, can help with this to some extent.

- A power backup system.
- Renewable energy sources.
- An additional charging station.
- Improved battery overcharging protection.
- Consistent supply of loads
- Maximum production and optimal investment.

6. REFERENCES

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