HYBRID POWER SYSTEM

Mayur Bhagyawant [*1], Amrut Adhav [*2], Vishal Naik[*3] Vishal Jadhav*[4]
Student Department of Electrical Engineering, Jaywant College of Engineering and Polytechnic K.M.Gad Sangli,Maharastra, India
Prof. V.P.Mohite Department of Electrical Engineering, Jaywant College of Engineering and Polytechnic K.M.Gad Sangli,Maharastra, India

ABSTRACT

The paper deals with the sizing and optimization of the hybrid systems with renewable energy sources. The classification according to different criteria has been made. A hybrid system is a dynamical system with both discrete and continuous state changes. For analysis purposes, it is often useful to abstract a system in a way that preserves the properties being analysed while hiding the details that are of no interest. We show that interesting classes of hybrid systems can be abstracted to purely discrete systems while preserving all properties that are definable in temporal logic.

Keywords: Solar1, Wind turbine2, Controlling unit3, Battery4, lightload5 etc….

I. INTRODUCTION

Around 2 billion people world-wide do not have access to electricity services, of which the main share in rural areas in developing countries. The fact that rural electricity supply has been regarded as essential for economic development. It is nowadays a main focus in international development cooperation. A renewable energy resource is a favorable alternative for rural energy supply. In order to handle their fluctuating nature, however, hybrid systems can be applied. These systems use different energy generators in combination, by this maintaining a stable energy supply in times of shortages of one the energy resources. Main hope attributed to these systems is their good potential for economic development.

Hybrid systems are another approach towards decentralized electrification, basically by combining the technologies presented above. They can be designed as stand-alone mini-grids or in smaller scale as household systems. One of the main problems of solar as well as wind energy is the fluctuation of energy supply, resulting in intermittent delivery of power and causing problems if supply continuity is required. This can be avoided by the use of hybrid systems which can be defined as “a combination of different, but complementary energy supply systems at the same place, i.e. .solar cells and wind power plants”

A hybrid energy system consists of two or more energy systems, an energy storage system, power conditioning equipment and a controller. A hybrid energy system may or may not be connected to the grid. Examples of energy systems commonly used in hybrid configurations are small wind turbines, photovoltaic systems, micro hydro, diesel generator, fuel cells, micro turbines, and Stirling engines. Typically batteries are used for energy storage but other options are flywheels and hydrogen energy storage systems. Power conditioning equipment consists of one or more of the following: controlled rectifiers, inverters/grid-tie inverters, charge controllers, and DC-DC converters. The task for the hybrid energy system controller is to control the interaction of various system components and control power flow within the system to provide a stable and reliable source of energy. With the wide spread introduction net-metering, the use of small isolated or grid connected hybrid energy systems is expected to grow tremendously in the near future. A number of hybrid energy systems in use/ under going testing in various parts of the world.

II. METHODOLOGY

In order to address the shortcomings of existing instructional techniques for electrical power systems, a hybrid wind-turbine and solar cell system has been implemented. The system was designed and implemented with the following goals:

To be completely different from traditional electricity labs and to be fresh and interesting.

To be intimately related to real-world industrial power issues such as power quality.

To show a complex, interrelated system that is closer to the “real world” than the usual simple systems covered in educational labs.

To motivate learning by introducing such elements as environmental and economic concerns of practical interest to the students.

III. BLOCK DIAGRAM

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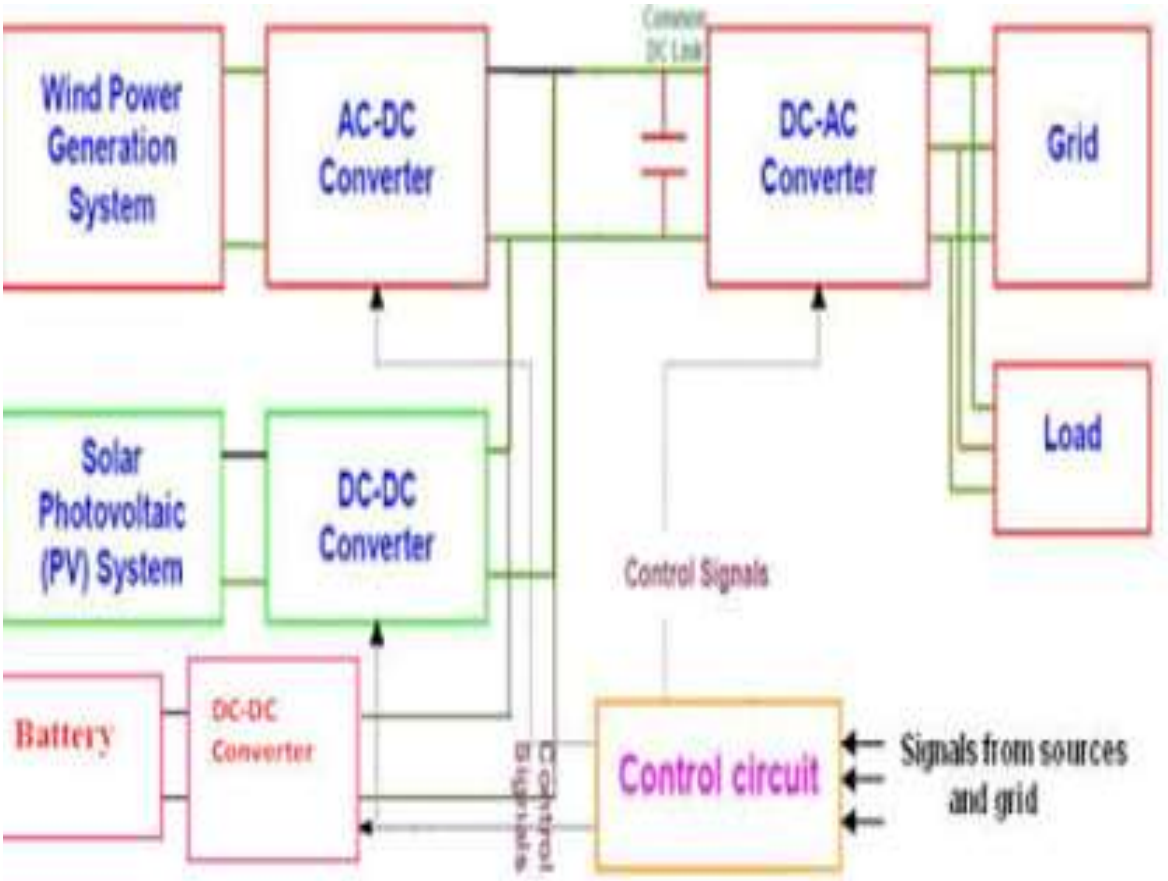

Figure1: Block diagram

IV. OPERATION

During daytime, solar photovoltaic array converts sunlight into electricity and stores this DC power in battery bank.

Wind generator starts generating power when wind speed exceeds the cut-in speed of the wind turbine. The wind turbine is of self-regulated type with protection for over speed.

The hybrid controller has inbuilt solar charge controller and wind charge regulator. It maximizes charging current and prevents excess discharge/overcharge of the batteries.

Inverter converts DC power into AC power to operate all standard electrical appliances. Inverter has inbuilt protection for short circuit and overload. During windy period, excess energy generated by wind battery charger is dissipated through a dump load.

V. OBJECTIVE

A key objective of the project is to improve the living standards in underprivileged remote villages in Rajasthan by increasing the uptake of alternative energy technology. By the constant stream of participants in various programs, conferences and seminars held at the Academy, this project acts as a reference point from which the social, environmental and economic benefits of such a technology are demonstrated. In collaboration with the scientist and engineer's wing of the Brahma Kumaris, several workshops on renewable energy have been held successfully and further activities in this area are planned. Contacts have been established with the Rajasthan energy development agency (REDA), the Gujarat energy development

Agency (GEDA) and the Ministry of Non-Conventional Energy Sources (MNES) and other NGO organizations to create a broad base of dissemination..

VI. ADVANTAGES

[1] The main advantage of solar energy is that this energy is free and available in plenty.
[2] The equipment used for solar energy are simple in construction, also they require minimum maintenance. It is pollution free.
[3] Wind energy is readily available, non-polluting power systemso it has no adverse influence on environment.
[4] Wind energy systems avoid fuel provision and transport
[5] It has low operating cost and also can be useful in supplying electric power to remote areas where other energy sources are scarcely available.

VII. CONCLUSION

A complete hybrid power system of this nature may be expensive and too labor intensive for many Industrial Technology Departments. However, many of the same benefits could be gleaned from having some subset of the system, for example a PV panel, batteries, and an inverter, or even just a PV panel and a DC motor. The enhancements to instruction, especially in making electrical power measurements more physical, intuitive, and real-world are substantial and the costs and labor involved in some adaptation of the ideas in this paper to a smaller scale setup are reasonable. The use of solar and wind hybrid power generation is an especially vivid and relevant choice for students of Industrial Technology as these are power sources of technological, political, and economic importance in their state. The key elements of this test bed concept presented in this paper are two or more renewable power sources connected to a power grid with complex electrical interactions.

VIII. REFERENCES

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