Microcontroller Based Variegated Solar-Wind Energy System

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ABSTRACT: *Hybridization of several types of renewable energy sources is an interesting alternative to ensure autonomy in a stand-alone system, since it compensates intermittent production of each one. It is an interesting alternative of stand-alone system. Maximization of power production can be done with the best economical control strategy. This paper outlines the design of a hybrid power system consisting of solar power system and wind power system and it's storage. Hybrid system offers more reliability from other system because the energy supply does not depend entirely on any one source. Solar and wind both are seasonal, both may not be available at all times which causes an difficulties in the power generation so reducing the efficiency and consistency in the power generation. For example, on a cloudy stormy day when solar   generation is low then enough wind energy available to make up for the loss in solar energy. The integration of the two energy sources as one helps us to increase the*

KEYWORDS- *solar Panel, Wind Turbine, Microcontroller, Rectifier, Stepper Motor, Inverter, Relay, analog MPPT*

I.   INTRODUCTION

The growing energy demand reduced supply of conventional fuels, evidenced by petroleum crisis. Development of alternative energy sources that are cleaner are renewable and produce little environmental impact. Among the alternative sources, the electrical energy from hybrid system is currently regarded as a natural energy source that is more useful, since it is clean, abundant and distributed over the Earth. In spite of the phenomena of reflection and absorption of sunlight by the atmosphere, it is estimated that solar energy incident on the Earth's surface is on the order of ten thousand times greater than the world energy consumption. A great advantage of hybrid system is the reduction of carbon dioxide emissions. These methods are accurate, fast and reliable. Hybrid system has become increasingly important as a renewable source due to its advantages such as absence of fuel cost, low maintenance requirement and environmental friendliness. For Hybrid systems, a maximum power point tracking (MPPT) method which is able to make good use of the electric power generated is required. These methods vary in complexity, sensors required, convergence speed, cost and range of effectiveness. Hybrid Systems holds the most potential to meet our energy demands. solar energy is present throughout the day but the solar irradiation levels vary due to sun intensity and unpredictable shadows cast by clouds, birds, trees, etc. Similarly, Wind energy is capable of supplying large amounts of power but its presence is highly unpredictable as it can be here one moment and gone in another. The common inherent drawback of hybrid systems are their intermittent natures that make them unreliable. This configuration allows the sources to supply the load separately or simultaneously depending on the availability of the energy sources. These regulators support step up and step-down operations for each renewable energy sources.
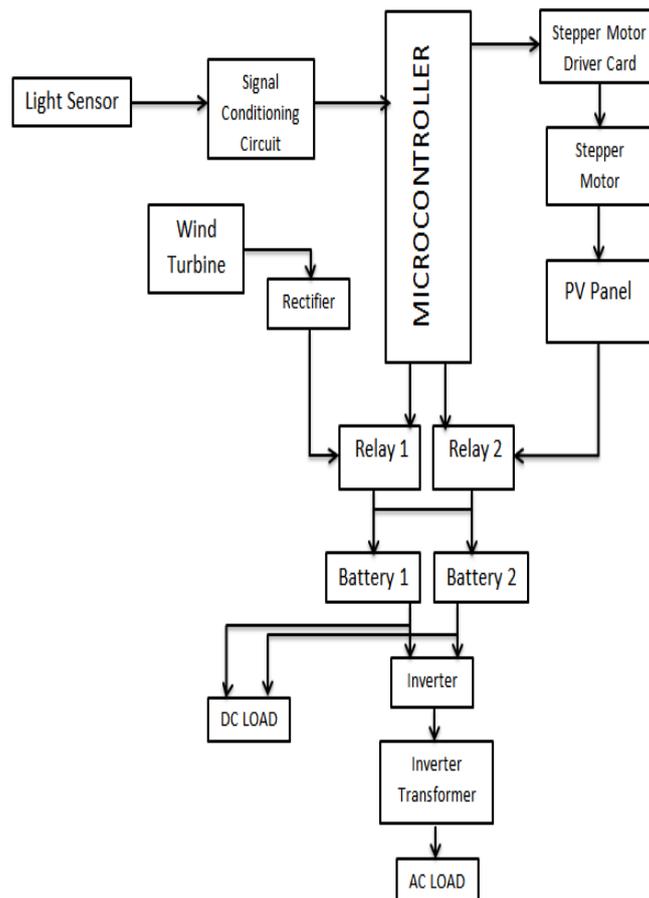
II.   SYSTEM DESIGN

Figure 1-Microcontroller Based Hybrid Solar-Wind Power System Block Diagram

III.   DESCRIPTION OF SYSTEM DESIGN BLOCK DIAGRAM

In this hybrid system design as shown in Figure-1 there are Light Sensor, 5 LDR (There can be more depending upon the size of power generation system.) mounted on the semi-circular path. Light sensor (LDR) is connected to the signal conditioning circuit. The output of the LDR is very small about 2 to 3V. Signal conditioning circuit is used to amplify this voltage to about 5V because microcontroller requires at least 5V to perform the operation. Microcontroller performs various operations like to control the stepper motor, Relay, set-reset the solar panel etc. Microcontroller is connected stepper motor in 3 steps which helps to rotate the solar panel and solar panel is connected to Relay 2. Wind turbine is connected to rectifier to convert the AC voltage to DC voltage because wind turbine only produces the AC voltage and to charge the battery directly we need the DC voltage. Rectifier is connected to Relay 1.

Relay 1 and 2 is electromagnetic switch which is controlled by microcontroller. Relay 1 and 2 used to store energy in Battery 1 and 2 respectively. These batteries are used alternatively. At a time one battery is being charged by the solar and wind and other battery is connected to inverter and to load which results to the discharging of battery. When Relay 1 is closed then Battery 1 is kept for charging and when Battery 1 is completely charge then Relay 1 will be open and this charged battery will be connected to load and at that time Battery 2 is kept for charging. This battery change automatically in this proposed design that is charge battery is connected to inverter and then to load and the discharge battery is kept for charging this automatic charge over takes place with the help of relays which are controlled by microcontroller and in this way this system produces electricity from the multiple energy sources. This design based bigger model should use PLC-SCADA to control everything graphically.

IV.   CONCLUSIONS

In this design we are using hybrid system to generate electric power. These are renewable sources and presented in the atmosphere and they does not cause any harm to the surrounding. For better performance of the solar sell we can use silicon nano particles (In future). The main advantages of the proposed analog MPPT method are low complexity, fast tracking speed and high tracking efficiency.

Advantage
- Max. Solar and Wind energy saving at reduced cost.
- During the winter the sun has a low position, tracking angle from sunrise to sunset is shortened.
- Solar cells directly convert the solar radiation into electricity using photovoltaic effect without going through a thermal process.
- It can run the load with greater reliability than the standalone Wind or Solar system.
- The advantage of this unit is that to run the system it does not need computer.
- Depending on the radiation intensity, it may sink under a predefined value for instance at dusk, when the sky is cloudy, tracking is interrupted.

Application
- Water heater.
- Home appliances.
- Solar cars.
- In Remote areas implementing small power systems units at each home.
- Using this system to getting hot water.
- Street lights etc.

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