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# Solar Wind Hybrid Power Generation

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***Abstract –*** Energy has playing an important role in human life and economic development. World total annual energy consumption is increased. While fossil fuel (coal, oil, natural gas) provides three quarter of total. At current energy consumption rate proven coal reserve should last for about 200 years, Oil for approximately 40 years and natural gas for annual 60 years with the contradiction between rapid development. Now a days Non-conventional Power generation is one of the fastest growing sectors. So we select the solar wind hybrid power generation. The sun is the ultimate source of limitless solar energy in the form of light and heat. In a solar power generation system solar panel absorb sunrays and convert it into DC current, that will be used to charge battery. Also wind energy is limitless from the nature. Wind turbine rotate due to the force of wind and its rotor connected with generator also rotate and give AC current. This project involves the solar wind hybrid power generation that will be used to generate electricity. This system will provide the basic electricity requirement for the house. Solar power and wind energy are free making this system viable long-term solution for electrification. Purpose of investment in solar wind hybrid power generation project is to enter in development of green energy technology, which is the only ultimate source of energy for future generation.

***Key Words:*** **Solar energy, wind energy, Hybrid Energy, DC current, PWM charge controller, Vertical axis wind turbine (VAWT),** ***Electricity.***

**1.INTRODUCTION:** In India most of people living in India where cut off of electricity is very serious problem and we required electricity for almost all the appliance which we used in our day-to-day life. So these is very important part of our life. Now there are two ways to produce electricity one is using Renewable energy source and other by using non-renewable energy sources. But non-renewable energy sources are limited and main drawback of using non-renewable energy sources are environment pollution. So we used renewable energy sources to produce electricity. Solar energy is present through a day but the intensity of the solar radiation depends upon the intensity of the sun and unpredictable shadows. Similarly wind energy is the fastest growing sector of clean energy. Wind energy is able to supplying large amount of power but it has intermittent in nature. The main drawback of both solar and wind system are unpredictable in nature and because of that continuity of the output power cannot be maintain and system become unreliable.

**Block Diagram:**

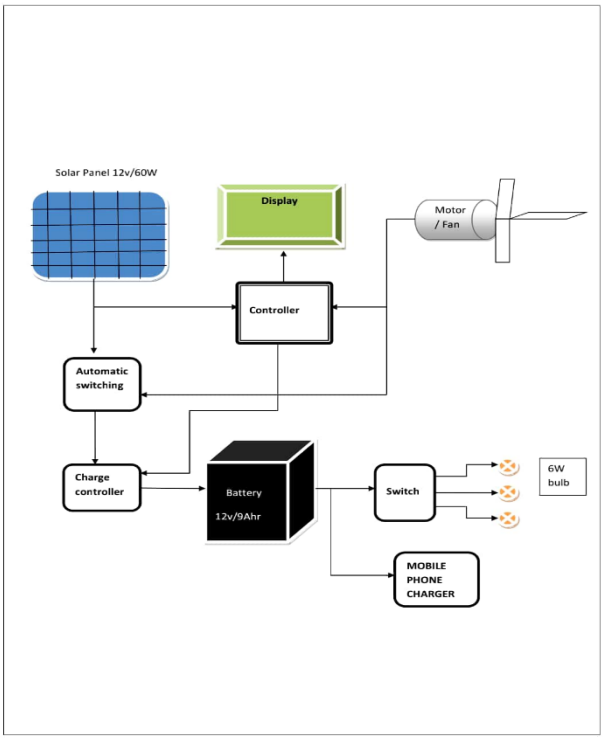


**fig1** block diagram of solar wind hybrid power generation

The Block diagram of our model shows the overview of how project works to generate electricity effectively. By comparing the voltage of the both the inputs controller gives signal to switching circuit to select appropriate input which is used to charge battery through pulse width modulation (PWM) controller.

**Solar Panel:**

Solar energy is available in day time. We can generate electricity by using solar cell (also known as PV cell). Solar cell is a device that convert light energy into electrical energy. Basically, solar cell is a p-n junction diode. The total amount of solar energy incident on earth is much more and it is never ending. Solar panel contains photovoltaic material which generate electricity when sunlight falls on it. The generation of electricity depends upon the intensity of sunlight.

For this model we used one luminous solar plate which has specification 60W/12V, short circuit current is 3.53A and open circuit voltage is 18.60V. When it is exposed to full intensity of sunlight the ideal output voltage is 24V. The output of solar panel given to the battery through the circuit. The output of solar panel is DC.

**Wind Turbine:**

Wind energy is a clean energy and it has no effect on greenhouse of the atmosphere. Wind turbine convert kinetic energy into electrical energy.

For this model we used vertical axis wind turbine (VAWT). In which we used 12V DC brushless geared motor. Geared motor has more torque as compared to gearless motor. We use PVC pipe for stand as well as PVC for blade. The output from wind turbine is AC which can convert into DC by using Rectifier, then the output is given to our circuit through battery.

**Charge Controller:**

Charge controller is electrical circuit which is used to monitor solar and wind input voltage, protect battery from overcharging and overheating, provide constant current and voltage to battery and improve battery life.

For this model we used PWM charge controller technique. Due to use of PWM, charge controller fetches current from solar panel or wind turbine and adjust according to the charging condition. When battery is discharge PWM provide output with large current to battery charge at fast rate. When battery reaches set point PWM algorithm slowly decreases charging current and voltage maintained constant.

**Circuit Diagram:**

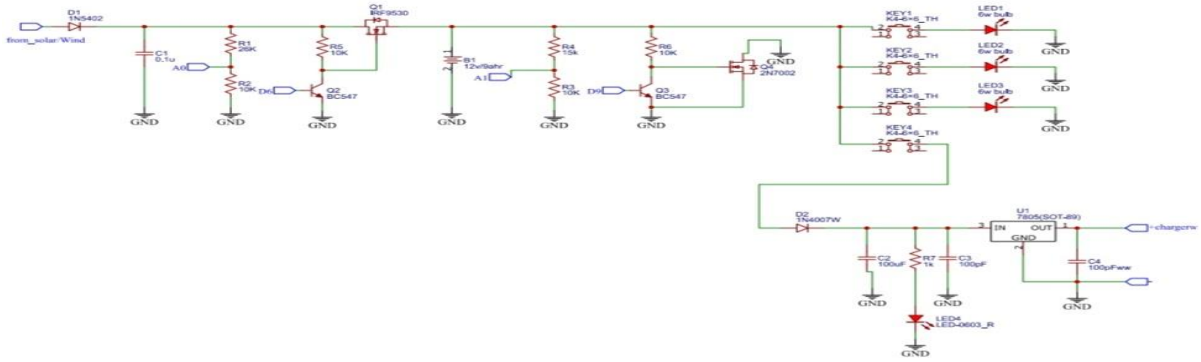

**fig2** circuit diagram of solar wind hybrid power generation

**Working:**

The wind turbine provide us AC supply. So that we have to convert AC supply into the DC supply, hence we use the rectifier. After that there is next process which is the switching circuit in that comparison of two voltages that are voltage coming from wind turbine and voltage coming from solar panel, the higher voltage is get sensed and further action is take place in charging circuit. Our charging circuit is mainly based on the PWM technique (pulse Width Modulation), the PWM wave is provided by the Aurdino ono. With the help of this Aurdino all signals are transferred to the circuit and further all necessary process take place. For storage of voltage, we have our battery which stores all the produced voltage and the display which we placed in this it gives this all-charging information on display. For display we have to give 5V supply. We can add one mobile charging socket also and for that mobile charging socket we use resistor divider network.

**Calculation:**

Calculation of solar Panel:

We use three 6W DC bulb so,

Total load = 18 W

We use this bulb at least 3hrs so total power required is,

P = 18*3 = 54W

So, we select 60W, 12V Solar Panel for this model

Solar maximum voltage (Voc) = 22.8V

Solar power voltage (Vop) = 19.7V

Panel power wattage (P) = 60W

Maximum current (I) = 3.64A

Battery Calculation

Battery size capacity =

(Total Watt * Backup hrs.)/Battery Voltage

= (60*18)/12

= 90

Battery current = Battery size capacity/10

= 90/10

=9A

So, we select 12V 9Ahr Battery

**Result:**

A 12V photovoltaic solar panel gives about 19.7V to 22.8V peak output by using 36 cells connected in series which is more than enough to charge battery. A vertical axis wind turbine (VAWT) gives about 18V to 22V peak output voltage which is sufficient to charge12V battery.

**Conclusion:**

This hybrid model of solar and VAWT have good source of green power. Present work of model experimentally shows the hybrid wind and solar power generation can be used to generate large amount of power at almost all time of day. This can be an alternative source of energy to the non-renewable resources. By using this model small villages can be lighted without the use of conventional energy sources. This can be implemented instead of single source, to gain more power almost at all times. Finally, conclude that this paper can give electricity without pollution to Residential purpose.

**References:**

[1] Text Book “Principles of Power System ” by “V. K. Mehta, Rohit Mehta”

[2] Reference Book “An Integrated course in Electrical Engineering” by “J. B. Gupta”