

A Review on Design and Fabrication of Solar Wind Hybrid Power Generation System

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Abstract—

In today's technology driven world electricity is one of the most primary requirement thing for our day to day life activities. As we all are very much aware of the fact that the renewable sources of energy is getting consumed at an incredibly fast rate. So it's high time for us to shift our focus from conventional to non-conventional sources of energy to produce electricity. The output of the electricity produced by non-conventional sources will of course be less than renewable sources. It does not have any harmful effect on the environment. The future of Energy generation depends on none other than Solar Energy as of now, also it is known as the most powerful natural source of energy. In the future, power generation from Conventional sources will be very difficult or else it may become impossible as well, which will be due to the non availability of coal. The increased per unit generation cost in the thermal power plant. The power loss in the transmission is also one reason. The environment will get affected due to the pollutants releasing harmful components from conventional sources. To overcome these difficulties in future we will have to depend on solar power generation. It is clean source of energy and it can transform to any source of energy with no effect on the environment.

KEYWORDS: Solar Energy, Wind Energy, Renewable Energy, Hybrid Power System, Electricity.

I. Introduction

We need the assistance of electricity in almost every aspect of our lives. With an ever increasing population the consumption of electricity will also increase very

much accordingly. But the main problem which will definitely arise will be the harmful effects caused by the way electricity has been produced upto this date which call as conventional sources e.g coal, natural gases, petroleum. We will have to change the way of producing the electricity and also we need to harm our environment in least possible way which therefore leads us to non conventional sources. our main focus will be solar energy and wind energy as they are available easily and the combination of both will be termed as Solar-

Wind Hybrid Energy System. They are using solar panels and wind turbine generators to generate and store electricity power. It can be noted if a small hybrid system that combines wind power, solar power technologies offers several advantages to home applications. In future as well as in present electrical power is most important in our daily life with no doubts over it at all, without electricity, we can't imagine the present world. This phenomenon of the combined power generation is to get non stop power during day and night for small power applications with storage battery.

II. Literature review

By utilizing sun powered exhibits, a progression of sun based cells electrically associated, a DC voltage is produced which can be genuinely utilized on a heap. Sunlight based clusters or boards are being utilized progressively as efficiencies arrive at more significant levels, and are particularly famous in distant regions where position of power lines isn't financially

reasonable. This elective force source is consistently accomplishing more noteworthy fame particularly since the acknowledgment of petroleum products weaknesses. Sustainable power as power has been used somewhat up to 75 or 100 years prior. Sources, for example, Solar, Wind, Hydro and Geothermal have all been used with shifting degrees of accomplishment. The most generally utilized are hydro and wind power, with sunlight based force being decently utilized around the world. This can be ascribed to the moderately significant expense of sunlight based cells and their low change proficiency. Sunlight based force is in effect intensely investigated, and sun oriented energy costs have now reached inside a couple of pennies for each kW/h of different types of power age, and will drop further with new advances, for example, titanium oxide cells. With a pinnacle research center proficiency of 32% and normal productivity of 15-20%, it is important to recuperate however much energy as could reasonably be expected from a sun based force framework. This incorporates decreasing inverter misfortunes, stockpiling misfortunes, and light assembling misfortunes. Light assembling is reliant upon the point of occurrence of the light source giving force (for example the sun) to the sunlight based cell's surface, and the nearer to opposite, the more prominent the force

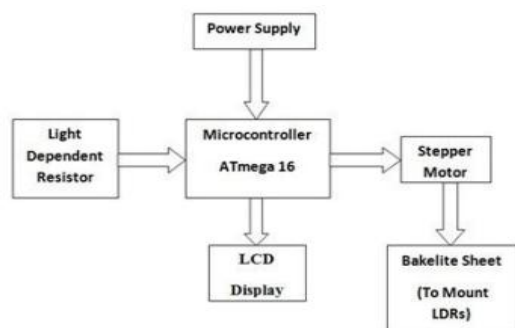


Fig: Block Diagram of Solar Tracking System

Methods of Tracker Mount

- Single pivot sun based trackers :

Single hub sun oriented trackers can either have a level or an upward hub. The level sort is utilized in tropical locales where the sun gets high around early afternoon, however the days are short. The upward sort is utilized in high scopes where the sun doesn't get exceptionally high, yet mid year days can be extremely long. The single pivot global positioning framework is the least difficult arrangement and the most widely recognized one utilized.

- Double hub sun oriented trackers:

Two fold hub sun based trackers have both an even and an upward pivot thus can follow the Sun's evident movement precisely anyplace in the World. This kind of framework is

utilized to control galactic telescopes, thus there is a lot of programming accessible to naturally foresee and follow the movement of the sun across the sky. By following the sun, the productivity of the sunlight based boards can be expanded by 30-40%. The double hub global positioning framework is additionally utilized for concentrating a sun powered reflector toward the concentrator on heliostat frameworks..

III. Methodology

The worldwide need to moderate the planet, energy and fulfill the ceaseless interest for electrical energy age has driven us to investigate new wellsprings of supportable energy, for example, sun oriented and wind just as other maintainable fuel sources. The photovoltaic wind hybrid system as shown in Figure 1, is a system that can be integrated into two or more renewable sources of energy (solar-thermal, geothermal, biomass, hydro etc.). Those systems are integrated to provide electricity or heat, or both, to supply the demand, and taking advantage of the availability of solar and wind energy, in places where these two sources of renewable energies are complementing to each other. Interested readers are advised to consult reference on the subject

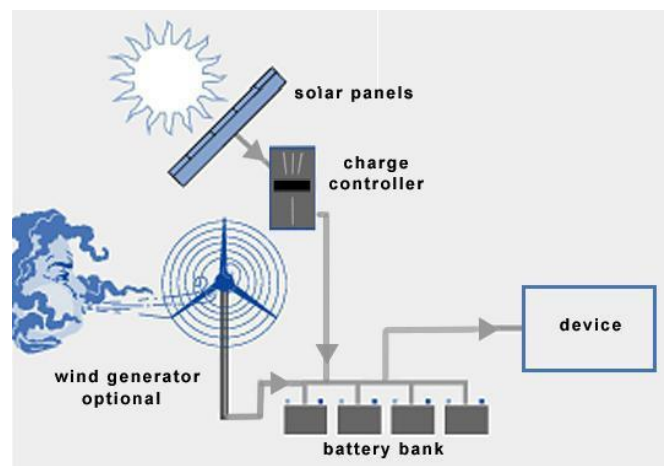


Fig: Schematic of a photovoltaic Hybrid System.

The photovoltaic breeze crossover framework as displayed in Figure 1, is a framework that can be coordinated into at least two sustainable wellsprings of energy (sun powered warm, geothermal, biomass, hydro and so on) Those frameworks are incorporated to give power or heat, or both, to supply the interest, and exploiting the accessibility of sun based and wind energy, in places where these two wellsprings of sustainable power sources are supplementing to one another. Intrigued perusers are encouraged to counsel reference regarding the matter. The breeze energy relies upon the states of the breeze and encompassing conditions, the breeze turbine is suggested where normal yearly wind speeds

are higher than 6.5m/s at a stature of 50m. Then again, photovoltaic energy has been one of the sustainable power sources with fast mechanical development. It has been accounted for that its yearly creation of sun based boards became ten times from 1990 to 2003 (50 MW to 500 MW), and is in steady development. The capacity of the photovoltaic sunlight based board is straightforward; sun oriented boards get sun based radiation type of light and accordingly create a possible distinction at its closures as nonstop current. These boards are ordinarily associated in equal or arrangement relying upon the force and burden prerequisites.

It ought to be noticed that a cross breed framework, for example, sun oriented/wind half and half should have load/charge regulator which controls the breeze turbine and sunlight based board simultaneously and permits the change and change of wind and sun powered energies into electrical energy and therefore, stores this electrical energy in the batteries bank. It ought to be likewise noticed that the driver of the crossover Wind/Solar is the main part in the out-of-network framework, because of the control that permits the activity of all the mixture framework. This paper is proposed to examine the development and execution of a framework for the estimation of electrical force boundaries like amperage and voltage of the crossover framework; photovoltaic sun based breeze, to assess and investigate the framework execution.

With the fast expansion in populace and monetary turn of events, the issues of the energy emergency and an Earth-wide temperature boost impacts are today a reason for expanding concern. The usage of environmentally friendly power assets is the critical answer for these issues. Sun powered energy is one of the essential wellsprings of spotless, plentiful and limitless energy that gives elective energy assets, yet additionally improves natural contamination.

Sunlight based following is the most fitting innovation to improve the power creation of a PV framework. To accomplish a serious level of following precision, a few methodologies have been broadly examined. For the most part, they can be named either open-circle following sorts dependent on sun based development numerical models or shut circle following sorts utilizing sensor-based input regulators. In the open-circle following methodology, a following equation or control calculation is utilized. Alluding to the writing, the azimuth and the rise points of the Sun were dictated by sun based development models or calculations at the given date, time and geological data.

The control calculations were executed in a microchip regulator. In the shut circle following methodology, different dynamic sensor gadgets, for example, a few gadgets (CCDs) or light ward resistors (LDRs) were used to detect the Sun's position and an input blunder signal was then created to the control framework to consistently get the greatest sun based radiation on the PV board. Sunlight based following methodologies can be executed by utilizing single-hub plans, and vertical pivot structures for higher precision frameworks. All in all, the single-hub tracker with one level of opportunity

follows the Sun's development from the east to west during a day while a solitary pivot tracker additionally follows the height point of the Sun. Lately, there has been a developing Volume of examination worried about vertical hub sun powered global positioning frameworks.

Moreover, such frameworks consistently include complex following procedures utilizing microchip chips as a control stage. In this work, utilizing an upward hub with just single following engine, an endeavor has been made to create and execute a basic and productive control plot. The two tomahawks of the Sun tracker were permitted to move at the same time inside their individual reaches. Using traditional electronic circuits, no programming or PC interface was required. Also, the proposed framework utilized an independent PV inverter to drive engine and give power supply. The framework was independent and self-ruling. Test results have shown the plausibility of the following PV framework and checked the benefits of the proposed control execution.



Fig: wind turbine

Power has helped in diminishing actual endeavors generally, yet, the manner by which it is delivered is a significant matter of concern. Indeed, even today, a large portion of the power that we use is created through traditional techniques. These regular techniques generally utilize petroleum derivatives to create power. Not exclusively are these techniques costly, yet additionally aim grave harm to the climate. The utilization of powers for the age of power brings about expanded expenses and outflows of unsafe poisons. The solitary option is another strategy that isn't just modest and productive, yet in addition eco-accommodating.

The Solar Tracking - Vertical Axis Wind Turbine System is fit for fulfilling both these necessities. As well as being eco-accommodating, it is additionally generally less expensive when contrasted with the ordinary strategies for power age. This turbine utilizes both Solar and Wind Energies to create power. In this way, we have two productive and endless hotspots for continuous age of power. The framework has two essential parts – one for age of power through Solar Energy and another for age from Wind Energy. Indeed, even on account of nonappearance of both of the two sources, the other

leftover source could be utilized to enhance the shortfall of the previous. Because of this load of highlights, the Solar-Vertical Axis Wind Turbines could be considered appropriate for supplanting the current old methods for power age.

Since, in addition to the fact that they are less expensive, financial and profoundly effective. These turbines are making progress step by step and ideally will be useful in causing us to accomplish the since a long time ago sought-after objective of green and clean energy.

Benefits of Solar Energy

- It is a Non-Conventional fuel source.
- The Sun is a widespread source and it can't lessen.
- Free from Pollution.
- Cost of fuel is free.
- It is a dependable one

Presently a-days in India the focal part is found to have age of power by utilizing sustainable power assets like coal, gas, oil, water or atomic as fuel in essential order. The use of coal and atomic substrate in essential way delivers hazard and establishes the hazardous effect over climate. Subsequently utilization of half and half blend of sun based and wind mix gives the record of better climate and lessen the use of existing petroleum products. Again the independent framework, for example, wind or nearby planetary group can't create the energy constantly. Consequently energy ought to be created with the assistance of blend of sustainable power assets.

The yearning of power created by different regions across the world has been reenacted by utilizing sustainable way along these lines incredible assortment of network power supply. Around 30,000 breeze turbines and 1, 00,000 off-network sun based PV boards are introduced everywhere on the world. The specialized possibility of PV wind crossover framework in given scope of burden request was assessed and efficient assessment of independent PV, independent breeze and PV wind half breed framework have been created utilizing the model. It offers age of force in rustic regions. Crossover model with appropriate gathering is unmistakable fascination for late years.

To produce the power with the assistance of VAWT (Vertical pivot wind turbine). The VAWT is use for produce the 10watt D.C. power and LED is turn on. A VAWT shouldn't be situated into the breeze, the force progress instruments can be mounted at ground level for simple access. For producing the force it is rely upon the speed of the breeze. In any case, we guaranteed that VAWT is producing the fixed D.C. yield which is relying upon the speed of the breeze.

IV. experimental results

The point of our subject is to introduce a sunlight based energy assortment innovation by a photovoltaic cell. To introduce this proficient sun powered dispersed age framework, a double pivot sun oriented tracker is planned. The tracker effectively tracks the sun and changes its position appropriately to boost the force yield. The planned global positioning framework comprises of sensors, microcontroller worked control circuits to drive DC engines and stuff bearing courses of action with supports and mountings. Two outfitted dc engines are utilized to move the sun oriented board so that sun's bar can stay lined up with the sun based board
Why we go for Solar Energy :

Generally we can generate power in two ways

- Conventional Fuels.
- Non Conventional Fuels.

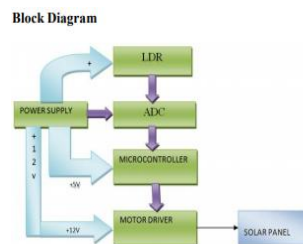


Fig:Automatic dual axis solar tracking system

Because of the unreasonable use of ordinary energizes there has been consumption in our normal assets. As per the scales, energizes like coal will last roughly for about 100years and petroleum and diesel for around 15 years. Along these lines the future force relies completely upon Non Conventional Fuels. Under the class of Non-Conventional Fuels we have are Solar, Wind, Ocean, Tidal, and Geothermal fuel sources. The explanation with respect to why we are picking just sun based energy in our venture is a result of its benefits when contrasted with the other fuel sources. 1) In India, the speed of the breeze is simply 15 to 20km/hr. and furthermore this is conceivable just at uneven and immense regions (far off regions) yet at the same time the transformation of wind energy to valuable energy is practical. 2) For Tidal energy we require full moon and half-moon days. Likewise we can extricate more measure of energy at full moon days in light of the fact that there are more tides on this day. This is on the grounds that the Sun, the Moon, and the Earth arrive in an orderly fashion on full moon day, while they are opposite on half-moon days. Additionally, we have 702 tides each year as per the scales. 3) For the Geothermal energy hot temperatures and rough regions are required. Despite the fact that it extricates immense measure

of energy of about 88% contrasted with the other fuel sources yet the transformation proficiency is low of about 15%.

v. CONCLUSION

Creating half breed frameworks is quite possibly the most helpful and powerful answer for delivering power when contrasted with non-sustainable power assets. It's difficult less exorbitant yet additionally it doesn't make any mischief the climate. Something else is that it tends to be utilized to create power in bumpy regions, where it is very hard to communicate power by regular strategies. Contingent upon the necessity its arrangement can be chosen. Every one individuals in this world ought to be spurred to utilize non-regular assets to deliver power to make them self-solid somewhat. Long life expectancy, less upkeep is a portion of its in addition to point. It simply requires some high introductory speculation.

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