# Renewable Energy Forecasting for an Integrated Smart Grid

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***Abstract:-***Now a day's electricity is most demanded installation for the mortal being. All the conventional energy coffers are depleting day by day. So we've to shift from conventional tonon- conventional energy coffers. In this the combination of two energy coffers is takes place i.e. wind and solar energy. This process reviles the sustainable energy coffers without damaging the nature. We can give continued power by using cold-blooded energy system. Principally this system involves the integration of two energy system that will give nonstop power. Solar panels are used for converting solar energy and wind turbines are used for converting wind energy into electricity. This electrical power can use for colorful purpose. Generation of electricity will be takes place at affordable cost. This paper deals with the generation of electricity by using two sources combine which leads to induce electricity with affordable cost without damaging the nature balance.

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***Keywords:-***Energy, Microcontroller, Solar panel Resistance, LCD***.***

## 1. INTRODUCTION

Now a day's electrical energy is generated by the conventional energy resources like coal, diesel, and nuclear etc. The main drawback of these sources is that it produces waste like ash in coal power plant, nuclear waste in nuclear power plant and taking care of this wastage is very costly. And it also damages he nature. The nuclear waste is very harmful to human being also. The conventional energy resources are depleting day by day. Soon it will be completely vanishes from the earth so we have to find another way to generate electricity. The new source should be reliable, pollution free and economical. The non-conventional energy resources should be good alternative energy resources for the conventional energy resources. There are many non-conventional energy resources like geothermal, tidal, wind, solar etc. the tidal energy has drawbacks like it can only implemented on sea shores. While geothermal energy needs very lager step to extract heat from earth. Solar and wind are easily available in all condition. The non-conventional energy resources like solar, wind can be good alternative source. Solar energy has drawback that it could not produce electrical energy in rainy and cloudy season so we need to overcome this drawback we can use two energy resources so that any one of source fails other source will keep generating the electricity. And in good weather condition we can use both sources combine.

## 2. LITERSTURESURVEY

[1] Hybrid Power Generation by Using Solar and Wind Energy: Case Study Peter Jenkins1, Monaem Elmnifi2, Abdalfadel Younis3, Alzaroog Emhamed4 Hybrid Power Generation by Using Solar and Wind Energy: Case Study
Energy is critical to the economic growth and social development of any country. Indigenous energy resources need to be developed to the optimum level to minimize dependence on imported fuels, subject to resolving economic, environmental and social constraints. This led to an increase in research and development as well as investments in the renewable energy industry in search of ways to meet the energy demand and to reduce the dependency on fossil fuels. Wind and solar energy are becoming popular owing to the abundance, availability and ease of harnessing the energy for electrical power generation. This paper focuses on an integrated hybrid renewable energy system consisting of wind and solar energies.

[2] Hybrid Power Generation System using Solar and Wind EnergyK. B. Mohan Krishna, S. Prathap, K. N. Lokesh Chandra Assistant Professor Ug Students Department Of Mechanical Department Of Mechanical Vemu Institute Of Technology Vemu Institute Of Technology P. Kothakota - 517112 P. Kothakota– 517112

This paper proposes a hybrid power generation system using Solar and Wind energy. It is fact that energy is an important resource for any country in the world to develop economically strong in all aspects. Without energy one cannot sustain the life such as transportation from one place to another, home needs, industrial purposes etc.

WORKING &CONSTRUCTION

☐ A hybrid solar-wind system be composed wind turbine, PV array, inverter, battery bank, controller and cables .
The PV array and wind turbine working with each other to satisfy the demand. When energy sources (solar-wind) are abundant, the generated power from the solar, in the day time will continue to charge the battery until it is fully charged.
On contrary the when energy sources are poor, the battery will release energy to assist the PV array and wind turbine to cover the load requirements until the storage is depleted.
The hybrid solar wind system model is based on the performance of individual components. so as to predict system performance, each of the power sources must be designed separately and integrated to meet the required reliability.
If the power output prediction from these individual sources is accurate enough, the resultant combination will deliver power effectively.
A hybrid system could be designed to operate either in isolated mode or in grid-connected mode, through power electronic interface.
Depend the hybrid system that studies on wind and solar energies as the main power resources and it is backed up by the batteries as shown in Figure 4. Used Batteries are because of the stochastic Features of the system inputs.

it is used to meet the electricity demand while the solar and wind energies are not adequate. The basic income variables in the hybrid model are wind speed, solar radiation, and temperature.
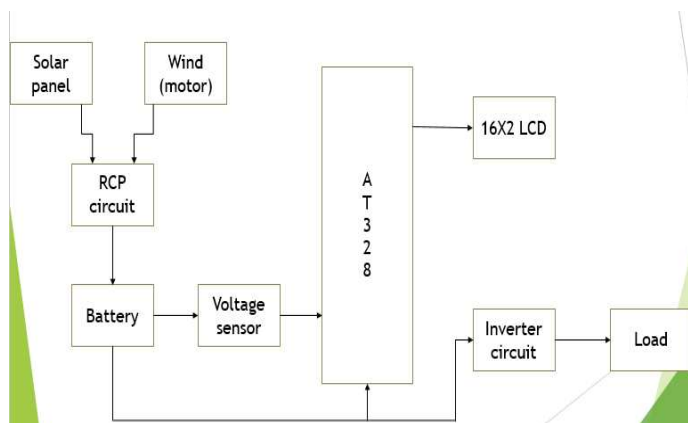


**Fig -1**: Block Diagram

constant DC supply. This 5V DC is used to supply power to the microcontroller and the LCD .Power supply to the LCD is given from the voltage regulator.

When fault is induced by operating any of the 12 switches (to F position), they impose conditions like LG, LL, LLG fault as per the switch operation. As a result of the fault, there is a change in voltage value.This voltage value measured across the resistance is fed to the ADC of the microcontroller. Using this value,thearduino computes the distance. Finally the distance of the fault from the base station is displayed inkilometers.
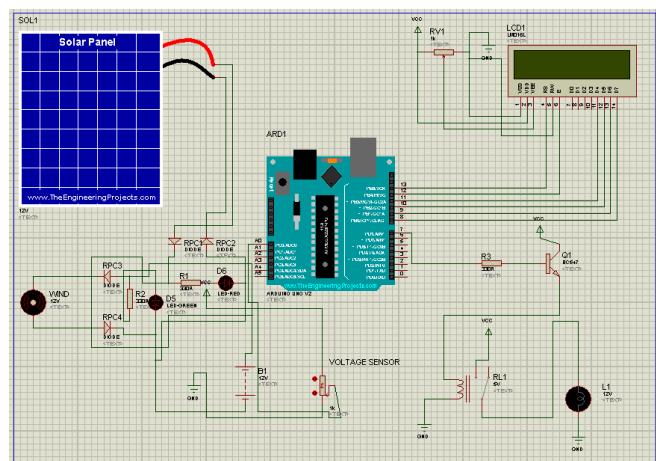


**Fig.** Circuit Diagram

### 2.1 POWERSUPPLY

The power supply circuit consists of stepdown transformer which is 230v step down to 12v.In this circuit 4 diodes are used to form bridge rectifier which delivers pulsating dc voltage eand then fed to capacitor filter the output voltage from rectifier is fed to filter to eliminate any a.c. components present even after rectification. The filtered DC voltage is given to regulator to produce 12v constant DC voltage.

### 2.2 RECTIFIER

The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C.
The rectifier may be a half wave or a full wave rectifier.Inthisproject,abridgerectifieris used because of its merits like good stability. The circuit has four diodes connected to form a bridge. A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification.
Rectifiers have many uses, but are often found serving as components of DC supplies and high-voltage direct current power transmission systems. Rectification may serve in roles other than to generate direct current for use as a source of power.

### 2.3 LCD

Liquid crystal display is interfacing to microcontroller 8051.Most commonly LCD used are 16*2 and20*2 display. In 16*2 display means 16 represents column and 2 represents rows. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content,which can be displayed or hidden,such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitary images are made up of a large number of small pixels, while other displays haveelements.

### 3.4 SOLAR PANEL

Solar panel is use to convert solar radiation to the electricalenergy. The physical of PV cell is very similar to that of the classical diode with a PN junction formed by semiconductormaterial. When the junction absorbs light, the energy of absorbed photon is transferred to the electron proton system of the material, creatingchargecarriers that are separated at the junction. The chargecarriers in the junction regioncreate a potentialgradient, get acceleratedunder the electric field, and circulate as current through an external circuit. Solar array or panel is a group of a severalmoduleselectricallyconnected in seriesparallel combination to generate the requiredcurrent and voltage. Solar panels are the medium to convert solar power into the electricalpower.

### 3.5 WIND TURBINE

Wind turbine is that system which extracts energy from wind by rotation of the blades of the wind turbine. Basically wind turbine has two types one is vertical and another is horizontal. As the wind speed increases power generation is also increases. The power generated from wind is not continuous its fluctuating. For obtain the non fluctuating power we have to store in battery and then provide it to the load. CHARGE CONTROLLER Chargecontroller has basic function is that it control the source which is to be active or inactive. It simultaneouslychargebattery and also givespower to the load. The controller has over-chargeprotection, short-circuit protection, pole confusion protection and automatic dumpload function. It also the function is that it should vary the power as per the load demand. It add the both the power so that the load demand can fulfill. And whenpower is not generating it should extractpower from battery and give it to the load

### 3.6 BATTERY BANK

We have to choosebattery bank size per the load requirement so that it should fulfill the requirement of load for calculating the battery bank size we need to find following data 1. Find total daily use in watt-hour (Wh). 2. Find total back up time of the batteryForincrease in battery bank size we need to connectcell in series so that we can get the largerbattery bank size.
 INVERTER

 We have to choose greater rating inverter than the desiredrating .Thepure sign waveinverter is recommended in other to prolong the lifespan of the inverter. Inverter is need to convert DC power into AC power. As our load working on the AC supply so we need to convert DC power. The input voltage Output voltage and frequency, and overallpower handling depends on the design of the specificdevice or the circuitry. The inverterdoes not produce

any power.

### 2.4 RELAY

Relay is sensing device which senses the fault and sends a trip signal to circuit breaker to isolate the faulty section. A relay is an automatic device by means of which an electrical circuit is indirectly controlled and is governed by change in the same or another electrical circuit. There are various types of relay: Numerical relay, Static relay and electromagnetic relay. Relay are housed in panel in the control room. Here three mini power relaya are used each for one of the three phases.The relays periodically scan the three ohases and send the signal to the arduino controller. The rating of each of the relays is about 12V.
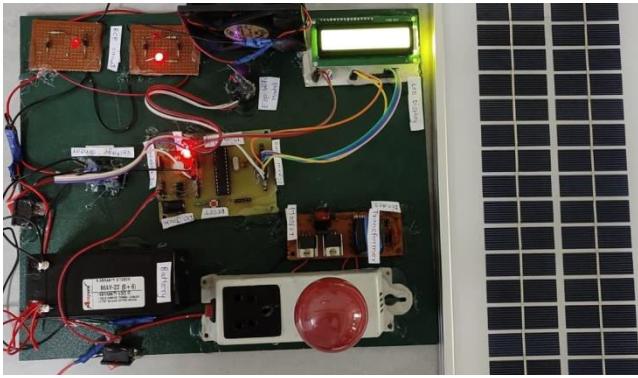
### 3. RESULTS
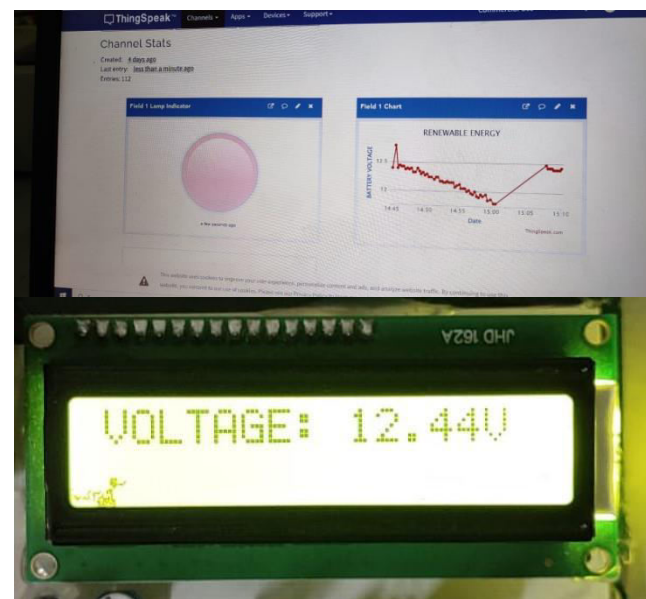
**Fig-3:** Project Image

## 3 ADVANTAGES

Regeneratable.

Nonpolluting.

Continuous supply of power.

High returns of investments.

## 4. CONCLUSION

Hybrid power generation system is good and effective solution for power generation than conventional energy resources. It has greater efficiency. It can provide to remote places where government is unable to reach. So that the power can be utilize where it generated so that it will reduce the transmission losses and cost. Cost reduction can be done by increasing the production of the equipment. People should motivate to use the non conventional energy resources. It is highly safe for the environment as it doesn't produce any emission and harmful waste product like conventional energy resources. It is cost effective solution for generation. It only need initial investment. It has also long life span. Overall it good, reliable and affordable solution for electricity generation.

## 5. FUTURESCOPE

The project is efficient for a continuous power generation, but power quality issues effects the performance of the overall systems. Power quality issues includes voltage sag, voltage swell, harmonics, transients which is mainly reduce the quality of power generation from the solar and wind energy. The usage of more power electronic devices also has an impact of the energy output leading to fluctuations. To overcome the power quality issues, it is recommended to use some techniques like implementing static compensators, series type LC filters UPQC. DSTATCOM helps to eliminate the harmonics, power factor correction and balance the load. For stability purpose STATCOM is used. Advanced methods need to be used to record the solar and wind data so that an estimation of power can be calculated for a continuous energy supply.

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