



## Hybrid Energy Generation and Power Monitoring Over IOT

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### ABSTRACT

Among the race in the countries of the world, Energy consumptions & power requirement is one of the most vital things in the world. Due to increase in the power consumption, conventional energy resources depleting day by day. Owing to considering this and also issue of the global warming and pollution, important of the non-conventional energy resources is increasing. The principal objective of this project is Rural Electrification via hybrid system which includes wind and solar energy. Our intension is to design a wind turbine compact enough to be installed on roof tops. So, we decided to design a vertical axis wind turbine (VAWT) over horizontal axis wind turbine (HAWT). Advantages of VAWT over HAWT are compact for same electricity generation, less noise, easy for installation and maintenance and reacts to wind from all directions. The motto of the project is to produce the energy in an eco-friendly way by using renewable sources of energy and to gain maximum intensity with solar and vertical axis wind turbine for maximum power generation.

**Keywords :** Wind Turbine, Inverter, DC Genrator, Charge Controller

### I. INTRODUCTION

Energy is the basic need for development and the requirement of energy is more due to the rapid increase in world population, technology and other political and economic condition, now a days electrical energy is generated by the conventional energy resource like coal, diesel and nuclear etc. And these are depleting day by day. So, there is an urgent need to switch on to non-conventional energy resources. Solar and wind are easily available in all condition can be good alternative source. With the rise in the demand of renewable energy resources the need of better utilization of these system has aroused. This in turn has given rise to the hybrid energy system, Hybrid Energy System is the combination of the two or more energysystems. Here, two sources are used solar and wind energy. In order to control the hybrid system IOT can be used, IOT(Internet of

things) is the inter-networking of physical device embedded with electronic, software, sensors and network connectivity that enable objects to collect and exchange data. IOT is used to switch the power supply i.e., wind energy and solar energy of a house through secure website when the grid supply is off, A prototype is designed to control the switching between these two sources of energy. With the advancement in technology provide sensors, metering, transmission, Distribution, and flexibility to consumers of electricity, it can be possible to control the sources of energy of a house by this prototype.

Hybrid renewable energy sources can be used as standalone for supplying power to the load and or as grid-connected for supplying power to the load and selling power to the utility company. Because of the variable nature of the resources, sometimes, renewable systems are used in conjunction with

storage systems .In general, standalone systems require battery and advanced energy management strategies but grid connected systems do not require battery and advanced energy management strategies.

## II. CLEANING METHODS AND MATERIAL

### Solar Energy and wind Energy:-

Solar energy is widely available throughout the world and can contribute to minimize the dependence on energy imports. In 90 minutes, enough sunlight strikes the earth to provide the entire planet's energy need for one year .Solar PV entails no greenhouse gas (GHG) emissions during operation and does not emit other pollutants. Solar has many benefits like system –friendly deployment, improved operating strategies, like advanced renewable energy forecasting and enhanced scheduling of power plants and also investment in additional flexible resources, comprising demand-side resources ,electricity storage, grid infrastructure and flexible generation.

### 1.3 Internet of Things and power monitoring:-

The internet of things (IOT) is a system of related computing devices, mechanical and digital machines, objects, people or animals that are provided with unique identifiers and also the potential to transfer data over a network without requiring human - to-human or human-to-computer interaction. Physical items are no longer disconnected from the virtual world, but can be controlled remotely through internet services. In fact –due to their diminishing size, constantly falling price and declining energy consumption – processors, communications modules and other electronic components are being increasingly integrated into everyday objects today.

The monitoring is used to monitor the power with the help of the wifi-module .If any fault can occurs in the solar cell or wind turbines then they can give signal to the cloude and with the help of Wi-Fi module it can be display at LCD. Applications of the

monitoring system are in the rooftop solar ,Solar street lights. Consumer products like solar water heating systems; Solar home lighting systems; solar lanterns; solar pumps; solar mobile chargers; solar cookers ; LED solar torch; solar RO plant; solar fan, solar inverters ,etc .can be monitor through this project. Commercial products like solar traffic signals, solar road studs/blinkers and also be monitor through the proposed system. India, where frequent power cut is very common. Due to which it is important to use renewable energy and monitoring it.by monitoring the energy forecast, households and communication and consumption during good weather.

### . Component:-

1. ATmega16
2. Potentiometer
3. LCD.
4. Solar Panel
5. Wind mill generator
6. MPPT charge controller.
7. Battery.
8. Wi-Fi module
9. Breakout board.
10. Relay module.
11. Copper clad.
12. Resistors.
13. Capacitor.

## III. RESULTS AND DISCUSSION

### Solar panel:-

Solar panels are the medium to convert solar energy into the electrical energy. Solar panels can convert the energy directly or heat the water with the induced energy. PV (Photo-voltaic) cells are made up from semiconductor structures as in the computer technologies. Sun rays are absorbed with this material and electrons are emitted from the atoms .This release activates a current. Photovoltaic is known as the

process between radiation absorbed and the electricity induced. Solar power is converted into the electric power by a common principle called photo electric effect. The solar cell array or panel consists of an appropriate number of solar cell modules connected in series or parallel based on the required current and voltage. In fact, direct tapping of solar radiation may be made, either by the generation of electricity from photovoltaic effect of incident solar radiation – using solar cells, or utilizing the heating effect of the solar insolation

#### **Wind turbine:-**

The wind energy is a renewable source of energy. Wind turbines are used to convert the wind power into electric power. Electric generator inside the turbine converts the mechanical power into the electric power. Wind turbine systems are available ranging from 50W to 3-4 MW. The energy production by wind turbines depends on the wind velocity acting on the turbine. Wind power is able to feed both energy production and demand in the rural areas. It is used to run a windmill which in turn drives a wind generator or wind turbine to produce electricity.

In fact, the availability of wind is the most important criterion that would determine the deployment of wind turbine in a certain place. By availability it means the wind speed due to which it will rotate the wind turbine so that mechanical energy of the wind is converted into electrical energy through generator. The wind speed decides the efficiency and economy of wind energy application for creating wind farms.

#### **MPPT Charge Controller:-**

The maximum power point tracking (MPPT) is a higher efficient DC-DC converter technology compared to "shunt controller" and "pulse width modulation (PWM)" technologies.

Using a non-MPPT charge controller is like connecting the battery directly to the solar module. A traditional charge controller may charge a battery with the voltage that is dictated by the battery. By nature, the voltage of a fully-charged battery is higher than that of a discharged-battery. Consequently, the power drawn by an empty battery is usually lower than that of a full battery.

#### **Wi-Fi Module:-**

Wi-Fi is a high speed internet connection and network connection without use of any cables or wires. The wireless network is operating three essential elements that are radio signals, antenna and router. The radio waves are keys which make the Wi-Fi networking possible. The computers and cell phones are ready with Wi-Fi cards. Wi-Fi compatibility has been using a new creation to constituent within the ground connected with community network. The actual broadcast is connected with in sequence in fact it is completed by way of stereo system surf as well as the worth of wires with monitor to classification prone. Wi-Fi allows the person in order to get access to web any place in the actual provided area. You can now generate a system within Resorts, library, schools, colleges, campus, personal institutes, as well as espresso stores as well as on the open public spot to help to make your company much more lucrative as well as interact with their own customer whenever. Wi-Fi compatibility can make surf with stare to company using their inspiring cable television much a smaller amount force down.

#### **Battery:-**

The batteries in the system provide to store the electricity that is generated from the wind or the solar power. Any required capacity can be obtained by serial or parallel connections of the batteries. The battery that provides the most advantageous

operation in the solar and wind power systems are maintenance free dry type and utilizes the special electrolytes. These batteries provide a perfect performance for long discharges.

#### Display:-

It is used to display stored voltage in battery.

#### Inverter:-

Energy stored in the battery is drawn by electrical loads through the inverter, which converts DC power into AC power. The inverter has in-built protection for Short-Circuit, Reverse Polarity, Low Battery Voltage and Over Load. **An inverter can be defined as it is a compact and rectangular shaped electrical equipment used to convert direct current (DC) voltage to alternating current (AC) voltage in common appliances.** The **applications of DC** involves several small types of equipment like solar power systems. **Direct current** is used in many of the small electrical equipment such as solar power systems, power batteries, power-sources, fuel cells because these are simply produced direct current and these devices never generate any kind of power because the power is generated by the DC source. In some situations like when the DC voltage is low then we cannot use the low DC voltage in a home appliance. So due to this reason, an inverter can be used whenever we utilize solar power panel.

#### Microcontroller:-

The microcontroller compares the input of both Power system and gives the signal to the particular relay and charges the DC Battery. The DC voltage is converted into AC Supply by Inverter Circuit. The MOSFET (IRF 540) is connected to the Secondary of the centre tapped transformer. By triggering of MOSFET alternatively, the current flow in the Primary winding is also alternative in nature and we get the AC supply in the primary winding of the

transformer. Depending on the environmental conditions, required energy for the system can be supplied either separately from the wind or solar systems or using these two resources at the same time.

#### Result:-

SOLAR PANEL OUTPUT = 12.5 V

WIND TURBINE OUTPUT = 5 V

TOTAL OUTPUT VOLTAGE

#### Figure

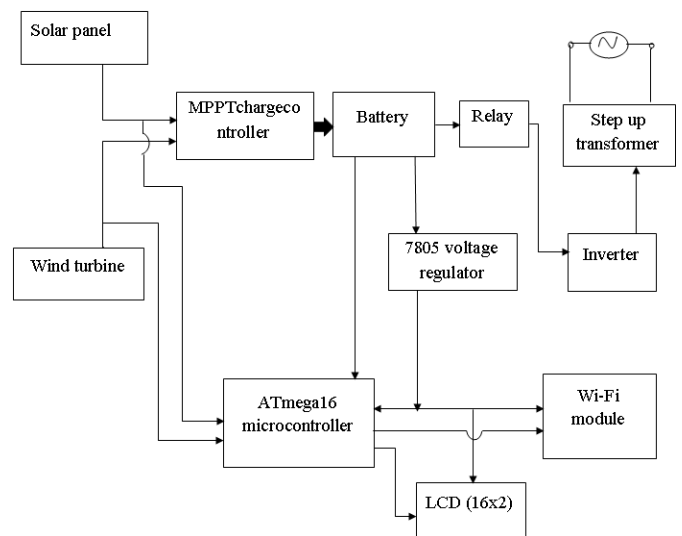


Figure 1: *block diagram of hybrid energy generation and power monitoring over iot*

## IV. CONCLUSION

This Paper focused on controlling of hybrid energy system using IOT. There is various combination of energy and all of them are alternative to each other like solar energy, wind energy, bio fuel, fuel cell, etc. But the need of controlling of hybrid energy system arises when it is installed for domestic or commercial purpose. At this point IOT plays an important role in controlling system. The main criteria being switching between the two sources of energy i.e. solar and wind energy without any inconvenience through a website

using NODEMCU Wi-Fi module. The data is transmitted wirelessly through website to NODEMCU module which controls the sources of energy. The transmitted data is controlled remotely using IOT. This enables user to have flexible control mechanism remotely through a secured internet web connection. This system helps the user to control the sources of energy, manually and remotely using smart phone or personal computer. This system is very efficient, cheaper and flexible in operation.

## V. REFERENCES

- [1]. J.B.V.Subrahmanyam, P.K.Sahoo and Madhukar reddy,” Local PV-Wind hybrid systems development for supplying electricity to industry”Acta Electrotechnica,Vol.53,No.1,2012,pp10-15.
- [2]. N.Sivaramakrishna & Ramakrishna Reddy,” Hybrid Power Generation through combined solar –Wind power and modified solar panel” International Journal of Engineering Trends and Technology (IJETT) - Volume4Issue5- May 2013,pp1414-1417.
- [3]. "Urban Eco-Greenergy™ Hybrid Wind-Solar Photovoltaic
- [4]. Energy System and Its Applications,” INTERNATIONAL JOURNAL OF PRECISION ENGINEERING AND MRANUFACTURING Vol. 16, No. 7, pp. 1263-1268.
- [5]. [www.Hybrid Solar Wind Electricity.htm](http://www.Hybrid Solar Wind Electricity.htm)