

# IoT Based Solar-Wind Hybrid Power System

\*Pralhad Sudam Gamare, #Laxman Subbu Naik

\*.#Assistant Professor, RMCET-Ambav, India. \*gamareps@rmcet.com, #naikls@rmcet.com

**Abstract:** one of the fundamental requirements for socio-economic development of nation is to provide reliable and sufficient electricity supply to the industries, home appliances and other services. At present, the entire country is facing a problem of lack of power back-up, insufficient supply of energy and global warming. All the ordinary energy sources are vanishing step by step. Hence, we need a constant and durable supply of energy irrespective of weather conditions. This paper focuses on electricity generation using Solar Wind hybrid system. The two primary motivations to plan solar and wind hybrid generation system using renewable energy source are energy reliability in different climate conditions and cost. The non-traditional energy sources like solar and wind can be great elective source and are effectively accessible in all weather conditions. Electrical energy could not be produced in cloudy and rainy season from Solar. So we have to utilize two energy sources with the goal that any of sources fails, other source will continue creating the power and in a good climate conditions, we can utilize these two sources combine.

**Keywords —** Hybrid System, IOT, Nano Antenna, Renewable Energy, Sensor, Solar Panel, Windmill.

## I. INTRODUCTION

In India, nearly 70% of people live in villages and as per recent survey, only 7.3% of the total, have 100% household connectivity, and about 31 million homes in towns are still in the obscurity. It appears to be very difficult to supply electricity to rural areas as the cost is very high to install the distribution lines. In most of the provincial and non energized areas, expansion of utility network lines includes high capital venture, high lead time, low load factor, poor voltage control and regular power supply. In our country, one of the basic requirements for socio-economic growth is to provide reliable and sufficient electricity supply to the industries, home appliances and other services. Now a day, the whole country is facing a problem of lack of power back-up, exhaustion of fossil energy and global warming. Hence, a convenient, cost-effective, pollution free and reliable power supply is an essential factor in the development of villages. Electricity can be generated either by using conventional energy resources such as wood, coal, natural gas, oil, etc. or by using non-conventional energy resources[4].

The primary disadvantage of these regular conventional sources is that it creates large measure of waste and dealing with this wastage is expensive. It also affects the environment. The nuclear waste is very harmful to all living beings. All the conventional energy resources mentioned are vanishing day by day. Hence alternate way for electricity generation is required. The better alternative way is to generate electricity by using non- conventional energy resources. There are numerous non-regular vitality assets like geothermal, tidal, wind, sunlight based, hydro power etc. The disadvantage of tidal energy is, it can only

generated on sea shores. While geothermal energy is a large process to extract heat from earth. As hydro-electricity power generating system is season based, it cannot afford much power. The non-traditional energy sources like solar and wind can be great elective source and are effectively accessible in all weather conditions. Electrical energy could not be produced in cloudy and rainy season from Solar. So we have to utilize two energy sources with the goal that any of sources fails, other source will continue creating the power and in a good climate conditions, we can utilize these two sources combine.

## II. LITERATURE REVIEW

In past, a great deal of work is there on utilizing sustainable sources to create energy for desalination plants. They have been broke down from the point of the physical / synthetic process just as the designing and momentary viewpoints. However as we will show in the next section, they still can't seem to be broke down from the point of view of IoT [1]. The reason of this proposed system is to get solid power from solar – wind hybrid energy generation system to the client with continuous electrical power supply, with moderate expences without disturbing the natural balance.

Soham Adhya et al. proposed an IoT based remote monitoring system for solar power plant, the approach is studied, implemented and successfully achieved the remote transmission of data to a server for supervision [2]. But a provision of advance remotely manage the Solar PV plants of various operations like remote shutdown, remote management is yet not implemented and this system fails in rainy season.

Rahul Mishra et al. proposed Biomass and Photovoltaic based hybrid renewable energy system (HRES) for meeting the electricity demand from households and other community loads which comprises the load demand of school, dispensary, shops, community offices etc. [3]. In this paper, efforts are made to exploit biomass and solar resources in the region and suggest some of the cost effective and environment friendly ways to meet the demand. The cost analysis predict in spite of having huge capital and installation cost renewable energy sources prove to be more reliable and environmental friendly source to provide electricity in remote or off grid areas. But generated energy is not sufficient to fulfill the requirement in city areas.

### III. PROBLEM FORMULATION

The approximate measure of electricity produced from different Renewable Energy Sources in India by IREDA is appeared as follows [5].

Sr. No	Energy source	Potential
01	Solar	20MW/sq.km
02	Wind	20,000 MW
03	Small Hydro	10,000MW
04	Ocean Thermal	50,000MW
05	Tidal	10,000MW
06	Biogas	12 Million plants
07	Biogas based cogeneration	3500MW
08	MSW	1000MW

Table 1: Renewable Energy potential in India

#### A) SOLAR POWER:

Solar based power is the cleanest, most dependable form of energy accessible and it tends to be use in several forms. The measure of intensity produced through solar based photovoltaic framework is around 20 MW/Sq. km in India. The extent of the sun beams that reaches the earth surface is sufficient to accommodate worldwide energy consumption. On average, 1,700KWh of power is delivered by exposing each square meter of land to sunlight every year [6]. Solar framework comprises of three important segments as Solar panels, solar photovoltaic cells and batteries in order to store energy. Solar photovoltaic boards convert the sun beams into electrical energy by energizing electrons in silicon cells utilizing the photons of light from the sun. Solar panels are mostly mounted on roof of the houses or

buildings to get more sun rays without any disturbance. The electrical energy produced utilizing sun powered boards can be put away in batteries or can be utilized for providing DC storage or can be utilized for inverter to encourage AC loads.

#### B) WINDMILL:

Solar energy is accessible only during day time though wind energy is available for the duration of the day relying on the environmental conditions. Wind energy is additionally one of the sustainable power source assets that can be utilized for creating electrical energy with wind turbines coupled with generators. Wind energy is the kinetic energy related with movements of atmospheric air. Wind power converts the kinetic energy in wind to generate mechanical power. A gear box is utilized for converting energy from one device to another device using mechanical techniques. There are different types of wind turbines, however most commonly used wind turbines are horizontal axis turbines and vertical axis turbines. Focal points of windmill incorporate clean power generation, less expensive than solar generation and there should be no shortage of wind, particularly in waterfront areas [7].

### IV. PROPOSED SYSTEM

#### A. SMART SOLAR WIND HYBRID POWER SYSTEMS:

The grouping of sustainable power sources, solar and wind are utilized for creating power called as solar wind hybrid system. This system is proposed using solar based boards and little wind turbines generators for producing electricity. The block diagram of proposed solar wind hybrid system is as shown in the figure in which the solar panels and wind turbine are used for power generation.

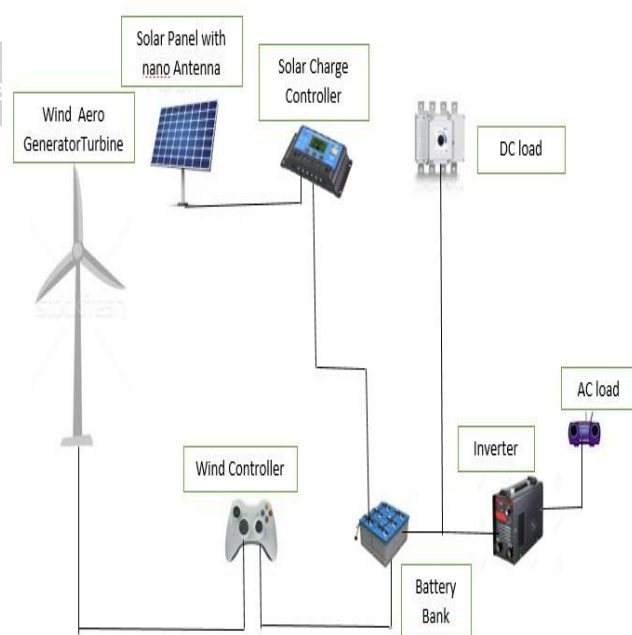


Fig.1 The Solar-Wind with Nano-antenna Power Generation System

Wind and solar power are correlative to one another, which makes the framework to produce electricity consistently. The major part of solar wind hybrid system are wind aero generator and tower, sun oriented photovoltaic boards, batteries, links, charge controller and inverter. The solar wind hybrid system creates power that can be utilized for charging batteries and of the utilization of inverter, we can run AC machines. Wind air generator is introduced on a pinnacle having a base stature of 20 meters starting from the ground level. The air generator gets wind at higher speed because of greater height and in this way produces more power. The solar-wind with Nano reception device is designed as shown in Fig. It has some extraordinary equipment used to charge the battery. In this way by actualizing coordinated solar Nano antenna Wind lighting power generation system in a compact package, we have a continuous power supply at the base expense to all places consistently.

### **B.IMPROVING SMART SOLAR WIND HYBRID POWER SYSTEMS USING IOT:**

The internet of things (IOT) is the system of physical devices, vehicles, house appliances and different things embedded with electronics software, sensors, actuators which empowers these objects to connect and exchange data [7]. In this system of managing smart grid power generation facilities by using power generation facility INTERNET OF THINGS based technology is used. This system recognizes smart grid power generation facility image in real time by using image sensor and GPS sensor and it provides site manager with detailed information, hardware drawing, sensor data, and history of power generation facility [4]. In addition, it provides location information of facilities so that site manager could identify the facilities of other environmental surroundings conveniently. Also site manager could perform regular check-up and maintenance of repair conveniently.

### **V. SOCIAL ASPECTS AND ADVANTAGES:**

Health Aspects: - A pollution free clean and pure energy can be generated.

Environmental Aspects: - It will provide uninterrupted power supply to all appliances with very high reliability and it can be used for 24 hour power generation irrespective of changing weather conditions.

Economic Aspects: it is cost saving. Also have less maintenance cost.

### **VI. CONCLUSION**

The combination of solar-wind energy source will be very useful in commercial areas. It provides pollution free energy and prevents accidents due to lighting. It is used to cut short power charge. As the overall system is monitored by site manager, it is possible to receive detailed information of

various facilities at site and accordingly helps him/her to take appropriate action. It is the most reliable and cost efficient. Yet, lot of work is to be completed so researchers have a scope to enhance the system to achieve better results.

### **REFERENCES**

- [1] U. Yaqub et al., "Implementation of a hybrid wind-solar desalination plant from an Internet of Things (IoT) perspective on a network simulation tool," *Applied Computing and Informatics* (2018).
- [2] Soham Adhya et al, "An IoT Based Smart Solar Photovoltaic Remote Monitoring and Control unit," 2nd International Conference on Control, Instrumentation, Energy & Communication (CIEC), pp. 432-436, 978-1-5090-0035-7/16/©2016IEEE 2016.
- [3] Rahul Mishra et al, "Sustainable Energy Plan for a Village in Punjab for Self Energy Generation," *international journal of renewable energy research*, Vol.3, No. 3, July, 2013.
- [4] Shweta Dhage et al, "Review on Grid Connected Solar Wind Hybrid Power Based IOT System", *International Research Journal of Engineering and Technology (IRJET)*, e-ISSN: 2395-0056, p-ISSN: 2395-0072, Volume: 05 Issue: 02 Page 1346-1348, Feb-2018.
- [5] Dr. Vadirajacharya, Dr. P.K.Katti, "Rural Electrification through Solar and Wind Hybrid System: A self sustained Grid free Electric Power Source", 2<sup>nd</sup> International Conference on Advances in Energy Engineering (ICAEE) , *Energy Procedia* 14(2012) 2081-2087.
- [6] Suprita Patil et al, "Solar Energy Monitoring System using IOT", *Indian J. Sci Res.*15(2):149-155, 2017 ISSN:2250-0138(online).
- [7] Kalaiarasi D. et al, "Enhancement of Hybrid Power System using IOT", *International Journal of Advanced Research Trends in Engineering and Technology(IJARTET)* vol.3, special Issue 19, April 2016. ISSN 2394-3777
- [8] Ajay Kumar Vinodia et al, "Promotion of Renewable Energy in Rural India", *ITPI journal* 3:2(2006) 21-28.