

# Measuring & Study of Renewable Energy & Battery Systems in Residential Micro Grids

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**Abstract**— Feasible power sources, vitality made from sun controlled, wind, biomass, hydro control, geothermal and ocean resources are considered as a mechanical choice for producing clean vitality. Be that as it may, the vitality created from sun and wind is significantly not as much as the age by oil subordinates, notwithstanding, power age by using solar and wind turbine extended rapidly. This paper presents the Microgrid system Power framework that tackles the sustainable power sources in Sun and Wind to energy control Framework control depends primarily on microcontroller. It ensures the perfect utilization of advantages and hence improves the effectiveness as contrasted and their individual method of age. In like manner it grows the unwavering quality and lessens the reliance on one single source. This Microgrid sunlight based wind control producing framework is appropriate for small industries and moreover for home application. Incorporating irregular wellsprings of energy, for example, sun powered with wind source has a few favourable circumstances for power framework. The primary favourable position is that charged battery can help the microgrid system at the periods that have high request from consumer. The importance is that because of battery energy storage it will be helpful for system to shift the load from time at power mostly used to less usage of power utilization time.

**Key words:** Solar Energy; Wind Energy; Microgrid System; Renewable Energy; Hybrid System

## I. INTRODUCTION

Ordinary power age frameworks utilize petroleum products as an essential wellspring of power, yet these regular assets are known to be the prevailing maker's ozone harming substances. Keeping in mind the end goal to decrease hurtful discharges and meet the expanded worldwide power request, sustainable power sources are presented as future substitutions [3]. The escalated innovative work in this field has prompted a gigantic development in renewable energy source establishments that are driven by taken a toll diminishes [1], [2]. Nonetheless, the abnormality of RESs, and the constraints of accessible battery storage framework advancements keep an abnormal state of renewable energy sources.

Sun and Wind Microgrid system, consist of sustainable power source innovations in a single plan, are useful since they give a higher adjust in vitality supply when contrasted with a solitary source framework. Micro grids, which are perceived as next generation power systems, provide two-way communication channels between energy generation sources and end users [3] and allow the shift of demand to off-peaks or to renewable generation periods.

This offers decreased activities and administration costs for utilities, bring down power costs for purchasers, and eventually, lessened discharges [4]. Moreover, the current increment in the utilization of electric vehicles (EVs) will

build power requests, yet in the meantime will expand vitality request edibility by the control of EVs charge periods and other vehicle-to-network applications.

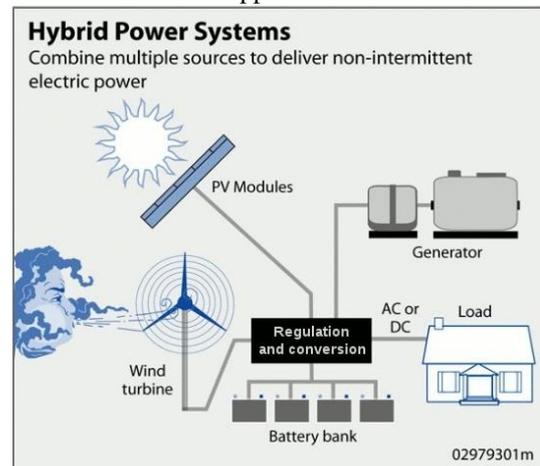


Fig. 1: An Overview of Microgrid System [1]

The of wind and sun oriented has the advantage that the this sources are supplement each other in light of the fact that the working conditions for every framework happen at various circumstances of the day and year. The power age of such a mixture framework is steadier and impels not as much as every one of the two part systems. The pivoting/non-convey competent daylight-based PV at the no matter how you look at it low duties clubbed with Pumped-warm power amassing can offer slightest costly dispatch proficient power round the clock on request. Though Solar panel generates PV creates less expensive discontinuous power amid the sunshine time, it needs the help of maintainable power age sources to give round the clock control.

## II. RELATED WORK

Wind control has transformed into a standard wellspring of energy age far and wide. The inevitable destiny of wind control, in any case, will depend upon the limit of the business to continue accomplishing cost diminishes and, finally, to achieve cost correspondence with customary wellsprings of age over a wide show of settings and locations. [2].

For quite a while, there has been no modification in the principal structure of the electrical power grid. Experiences have exhibited that the dynamic, halfway controlled cross section of the twentieth Century is ill suited to the necessities of the 21st Century. To address the challenges of the present power cross section, the new thought of smart system has risen. The wise grid can be considered as a bleeding edge electric power structure establishment for enhanced adequacy and enduring quality through motorized control, high-control converters, introduce day correspondences system, recognizing and metering advances, and current essentialness organization procedures in perspective of the streamlining of intrigue, imperativeness

and framework availability, and whatnot. The essential objective of this paper is to give a contemporary look at the recurring pattern front line in splendid structure correspondences and to discuss the still-open research issues in this field [3].

Another capable fixation for the controls gather related to the sharp grid is control structure, which have basic part in arrange relationship of weights and age. Devices that use control equipment for sharp framework affiliation join electric machines, and an extensive parcel of the more a la mode sorts of maintainable age. Power electronic interface tend to isolate device lead from arrange disrupting impacts. This isolating can destructively influence the response of the system repeat and can stress voltage fall. Power electronic interfaces can be controlled in ways that overhaul these negative impacts, inside the cut-off reasons for physical abilities. [5]

The required controls are zone based furthermore change with structure conditions. Complexities constrained over the transmission and allotment structure, with characteristic interchanges between dependable stream and discrete events. Power systems thusly are exhibited as dynamical structures, where the consistent stream is best addressed by differential-logarithmic models.

### III. PROPOSED SYSTEM

Daylight based Wind Power structure is the joined power making framework by wind process and sun energy board. It in addition combines a battery for the utilized to store the vitality delivered from the two sources, Using this formation control age by wind turbine when wind source is accessible and age from solar system when light source is available. The two systems are able to made control when the two sources are open. By giving the battery power supply is possible when the two systems are sit without moving.

Fig. 1. exhibits practical block diagram of wind sun oriented vitality framework the power made from wind process is of AC voltage which is changed over through AC-DC rectifier. A unique sort of converter is utilized to a stoup up or step down through MOSFET exchanging called "SEPIC" converter for wind process. For sun oriented system cuk converter is utilized for the control. The microcontroller controller fused in this plan, which consistently manages the task of sources and switches the comparing converters and nourished into change the battery or to the load relay through inverters. The yield of the inverter is associated with the heap and after that the voltage is ventured up by a transformer. The output circuit is utilized to give the gate voltage for the MOSFET of converters. LCD shows temperature and battery yield.

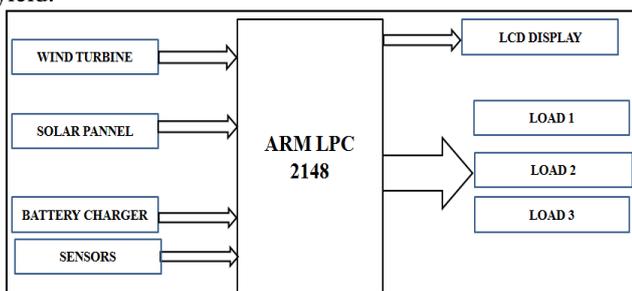


Fig. 2: Block Diagram of Microgrid Model

### A. Wind Based Energy Generation

Windmill are electric generators that utilization the vitality of the wind to convey fresh, releases power for solitary house, residences, private endeavors. With this direct, logically popular development, individuals can produce own specific energy and reduce their essentialness bills which also help for securing the earth.

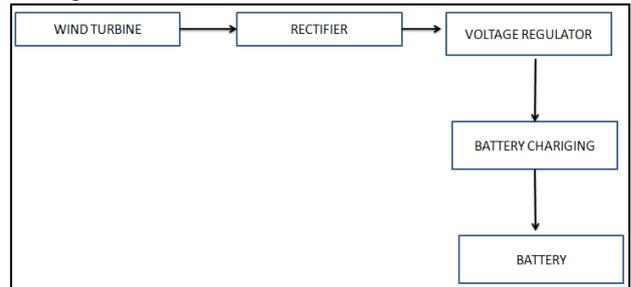


Fig.3: Block Diagram of Wind Based Energy Generation

Wind turbines rotate and generate electricity which is rectified by rectifier. This controlled by voltage controller. Battery stores the energy with the assistance of battery charging unit.

### B. Solar Based Energy Generation

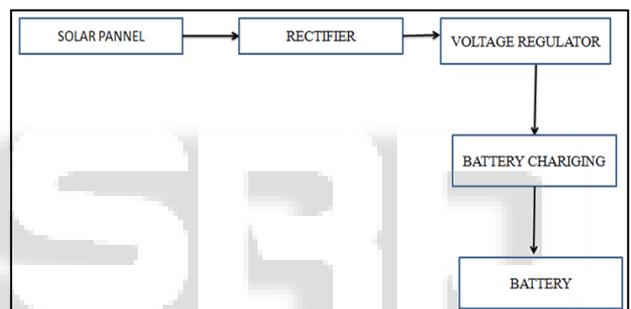


Fig.4: Block diagram of Solar Based Energy Generation

During day time, when light intensity is very high solar panel receives sun rays. This solar panel received energy converted to DC form by rectifier. This voltage is regulated by voltage regulator sends battery charging unit to charge the battery.

### IV. EXPERIMENTAL RESULTS

The Microgrid energy framework is actualized and the output power is fed to the load is indicated in figure. Output that is voltage and current esteems from the wind turbine, sun-oriented system, batteries, and load are projected in system and show on LCD screen. Energy production and utilization of each subsystem are computed.



Fig. 5: Block Graph of Solar Based Energy Generation

The determination of framework is:

- 1) Solar board Power = 20 watts
- 2) Wind turbine/generator = 3 W
- 3) System Voltage = 48V
- 4) Battery=12V
- 5) Inverter Rating (VA) 25
- 6) Output AC Voltage, +/- 10% = 230 V/AC
- 7) Output Ac Frequency, Hertz, +/- 0.5 % = 50 Hz

Result of Solar and windMicrogrid System is:

It shows the battery voltage, temperature and luminance.

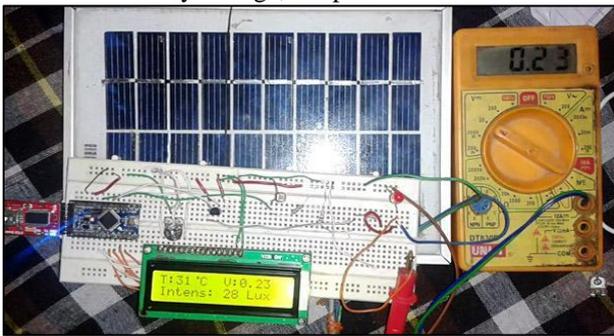


Fig. 6: Experimental Results

## V. CONCLUSION

In the present work a Solar and Wind Micro-grid essentialness system was realized. The requirements of energy fulfilled for a personal use, small industries, and educational institutes depending upon the requirement of consumer on site. Power is delivered to consumer which is generated by solar or wind source which stored in battery. Quality of system is improved as this subsystem is not totally depends on single subsystem. System also displaying the current charge on battery and temperature of surrounding so subsystem starts working according to environmental conditions.