



## DISTRIBUTION & ANALYSIS OF RENEWABLE ENERGY AND BATTERY SYSTEMS IN RESIDENTIAL MICROGRIDS

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**Abstract**— as electricity demands are increasing day by day causing unbalance in the present grid system which results in various causes like load shedding unbalance voltage etc which ultimately affects the consumers. Now to avoid all such situations the only option is to meet the demand by increasing generation but, we are also lagging with the conventional sources so generating more power is also not convenient by conventional ways. Thus, use of Renewable is quite important. The solar power reaching the earth's surface is about 86,000 TW. Covering 0.22% of our planet with solar collectors with an efficiency of 8% would be enough to satisfy the current global power consumption solar have tremendous potential for fulfilling the world's energy needs Smart grids promise to facilitate the performance of the grid system. The power industry has adopted "smart" grids that use information and communication technologies, which may make electric power systems more reliable and efficient. Renewable technology enhances the available energy resources. These technologies also enable integration of higher levels of renewable energy and conventional energy sources. The renewable sources are not "dispatch-able"—the power output cannot be controlled. Future energy sustainability depends heavily on how the renewable energy problem is addressed in the next few decades. Solar energy can be made more economical by reducing investment and operating costs and by increasing solar plant performance. Integration of solar system with the smart grid have to come up with the challenges put

forward by solar systems like technology barrier, uncertainty, social impact, economical aspects, free acceptance etc. In this paper, we consider path from

Conventional grid towards smart grid, challenges against integration of renewable energy, i.e. solar system. And impact of solar on grid stability, reliability of supply. Failure of grid which leads to total blackout which may lead to renewable energy as one of the solution to reduce impact of blackout-case. The section of the paper will concentrate on Ways of assimilation of solar system in Smart grid, challenges & benefits of integrated grid systems.

**Keywords:** Opt coupler, Energy meter.

### INTRODUCTION

The present energy emergency ends up noticeably worldwide issue for the world. We have to lessen the wastage of power in everyday life. In any case, the utilization of power expands year to year as more home machines are introduced. Along these lines, the present the energy sparing turns out to be first need. Due to the constrained fossil fuels, these eras have begun the utilization of diverse methods for power era like utilizing the sustainable power sources. Sun powered, wind and water sources are effortlessly accessible anyplace on earth. Sustainable power Sources as an imperative way to deal with meeting rustic energy needs, lessening contamination, and advancing financial improvement. The conventional utilization of fossil fuels for energy sources prompts numerous ecological concerns so there is an



expansion in the desires to look for the substitute arrangements. The heap shedding, higher electrical levy, cross endowments, the more successive power blackouts and conflicting force being produced likewise slants the need to search for substitute approach. As the interest for power increments in the current days, numerous businesses and occupants are searching for advanced approach to create energy. The Sustainable Energy Sources will satisfy their requirements when there is an expansion in the interest for electrical utilization. The Renewable power is either straightforwardly or, on the other hand round about got from sun. The Non Renewable Energy is the energy got from fossil fuels. There are different sorts of Renewable and Non Renewable power sources accessible. If there should be an occurrence of any disappointments in the sustainable power source framework or when the hotspot for delivering sustainable power source is not adequate to create energy, the framework winds up plainly pointless and it impacts the reliant applications. In such cases, the HRES assume an essential part. For instance, the when there is insufficient daylight to produce energy and just the Solar board PV is introduced, there emerges an issue of lack in the energy created. The HRES ends up noticeably relevant for this situation, When Solar board is utilized as a part of blend alongside the Wind turbines, the requested energy era is part between these two sources and subsequently the framework is less subject to one discontinuous RES. This guides a high security to the energy supply. The proposed framework makes utilization of the sunlight based board/turbine to create control and is being put away in the battery. This model supplies energy to the apparatuses in light of the figured measure of energy that would be utilized. The inserted Real Time working framework in this model sizes the measure of vitality that would be devoured, enhances the energy utilization.

## LITERATURE SURVEY

In a paper [1] the authors proposed keen HEMS framework with the MPPT strategy. By utilizing this method we can build vitality era by utilizing a similar equipment setup. In this framework

the vitality meters are not utilized. Basic shrewd home essentialness organization structure utilizing PIC controller is produced.

[2] Proposed the method of the power supply conveyance and administration in view of the request premise. The general framework includes a HEM unit that gives checking and control functionalities to a mortgage holder, and load controllers that accumulate electrical utilization information from chose apparatuses and perform neighborhood control in view of charge signals from the HEM framework.

[3] In 2011, J. Han, et al, proposed a plan of more proficient home essentialness organization structure to lessen control utilization in home range and consider the room effectively controllable with an IR remote. The room has programmed standby power off outlets, devices, and a Zigbee main unit. The Zigbee center point has an IR code learning capacity and teaches the IR remote control flag of a home gadget related with the electrical plug. At that point the electrical plugs and the light in the room can be controlled with an IR remote control. A regular programmed standby power cut-off outlet has a holding up time before removing the electric power. It expends standby power amid that time. To dispose of the holding up time, we kill the home gadget and the electrical plug in the meantime with an IR remote control through the Zigbee center point. This strategy effectively diminishes the standby power. The proposed HEMS give simple approach to include, erase, and move home gadgets to other electrical plugs. At the point when a home gadget is moved to the distinctive outlet, the vitality data of the home gadget is kept reliably and consistently paying little respect to area change. The proposed engineering gives more proficient vitality sparing HEMS. This works just consider the vitality utilization.

[4] Explains the framework with the low vitality application by utilizing Bluetooth. Controllers are interface with the Bluetooth for show the perusing in cell phones and Laptops. However, the Bluetooth run is short then it can't send the perusing

data's for more separate. Zigbee based Smart home vitality administration frameworks are incorporated with Wi-Fi organize through passage. Portal can give the UI and receptiveness to the specific framework. Through utilizing Zigbee intended for take the electrical readings, for example, vitality utilization from home apparatuses.

[5] System engineering for the brilliant framework is displayed. Necessities of security and answers for digital assault in the savvy matrix likewise examined. Framework we are utilizing ARM 7 Microcontroller (LPC2148). For vitality era reason we are utilizing sun powered boards and wind process. Likewise the vitality meters utilized for estimation reason. 16\*2 LCD show is additionally utilized. Zigbee Transceiver is utilized for remote correspondence reason. Zigbee depends on the IEEE802.15.4 convention. The scope of Zigbee is concealed to 100m. Scope of Zigbee is ten times more than that of Bluetooth, thus utilized Zigbee. [7] discussed about a system, GSM based AMR has low infrastructure cost and it reduces man power. The system is fully automatic, hence the probability of error is reduced. The data is highly secured and it not only solve the problem of traditional meter reading system but also provides additional features such as power disconnection, reconnection and the concept of power management. The database stores the current month and also all the previous month data for the future use. Hence the system saves a lot amount of time and energy. Due to the power fluctuations, there might be a damage in the home appliances. Hence to avoid such damages and to protect the appliances, the voltage controlling method can be implemented.

## PROPOSED SYSTEM

Here we have used two different Energy sources, one is the main power which is supplied by MSEB and the other one is from Renewable energy source i.e. from photovoltaic cell and by making use of this renewable energy source provides the reliable power supplies to the consumers. As controller will switch between the two power sources according to the available power by monitoring the power

consumption by different loads at home. The power generated using renewable energy sources, i.e. photovoltaic (PV) solar panels, is variable. Depend upon the season and weather conditions of day. voltage sensors are used to sense voltage flow of the individual supply which can be measured. This can effectively reduce power loss, low operating temperature, increase reliability.

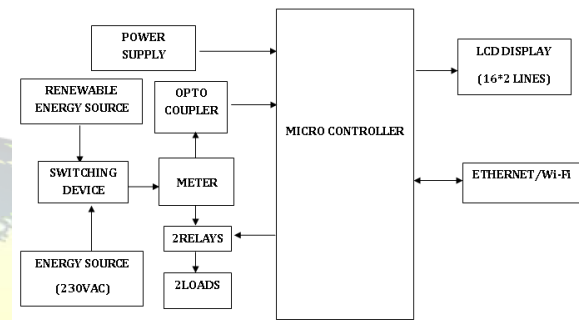


FIG: Block diagram.

The data collected will regularly update in the PC by the Wi-Fi/LAN modem. In Pc data authenticated user can access data from anywhere in the Grid and can analyze the power consumption. One of benefit is there, options is to check for the average power Consumption of a particular home. The user gets help to track his energy needs and accordingly plan the scheduling of his power sources. The compared between consumption data and consumption data of other times by means of graphical representation of comparison of average consumption data. Based on the power consumption data, the user plans ahead how and when to use its energy sources. The equipments which are carry on after we are not present at home is switch off. Thus monitoring and controlling of all opera ting devices is done through Wi-Fi.

## METHODOLOGY

### Solar Panel

The Solar panel works by allowing the photons, or the particles of the light to release the electrons from the atom, which in turn generates electricity. Solar energy systems consist of arrays of solar cells which



create electricity from irradiated light. The output of the PV (photovoltaic) system is primarily dependent on the intensity and duration of illumination. Solar electricity provides us with non-depleting, site-dependent and ecofriendly alternative energy option. PV offers clean, emission less, noise-free energy conversion, without involving any active mechanical system.

### Lithium Ion- Battery

The batteries convert electrical energy into electro chemical energy and resumes for usage when there is interruption in the power supply. The lithium –ion batteries have higher life cycle when compared to the other conventional lead acid batteries. The lithium – ion batteries have higher charging / discharging cycles

### OPTO COUPLERS:

There are many situations where signals and data need to be transferred from one system to another within a piece of electronics equipment, or from one piece of equipment to another, without making a direct electrical connection. Often this is because the source and destination are (or may be at times) at very different voltage levels, like a microcontroller which is operating from 5V DC but being used to control a triac which is switching 230V AC. In such situations the link between the two must be an isolated one, to protect the microprocessor from over voltage damage. Relays can of course provide this kind of isolation, but even small relays tend to be fairly bulky compared with ICs and many of today's other miniature circuit components. Because they are electro-mechanical, relays are also not as reliable and only capable of relatively low speed operation. Where small size, higher speed and greater reliability are important, a much better alternative is to use an Optocoupler. These use a beam of light to transmit the signals or data across an electrical barrier, and achieve excellent isolation.

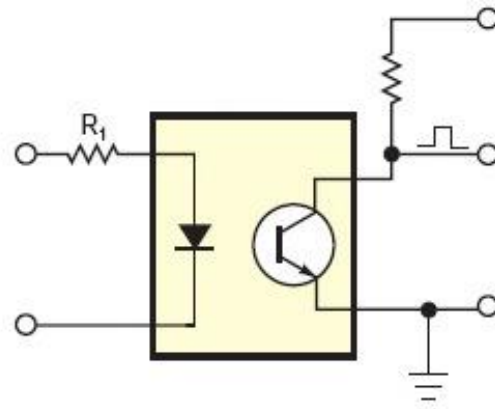


FIG: Optocoupler structure

### ENERGY METER

An electricity meter or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device. Electricity meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meters establish billing cycles and energy used during a cycle. In settings when energy savings during certain periods are desired, meters may measure demand, the maximum use of power in some interval. In some areas the electric rates are higher during certain times of day, reflecting the higher cost of power resources during peak demand time periods. Also, in some areas meters have relays to turn off nonessential equipment

### CONCLUSION

In this paper, the key technologies of smart grid have been studied and reviewed. The major importance of renewable energy, renewable energy based energy conversion systems, and distributed power generation has been reiterated. It can be concluded that with the advancements being made in the area of renewable energy and distributed power generation, Smart grid has a demanding and critical role in the future of efficient power generation and distribution. The designed system is easy to implement and very



customizable according to needs. It provides very efficient methods of monitoring and controlling our renewable energy resources which would otherwise have been underutilized. It ultimately saves the money and help to minimize pollutions because use of non-renewable energy will reduce a carbon emission footprint. Finally it gives a very effective solution for implementing green energy techniques on a larger scale.

## FUTURE SCOPE

In Proposed System, we can modify the hardware for use of system on broad scale. As we can increase the Energy storage capacity (Battery size) as well as size of the solar panel. Additionally we can incorporate other sustainable power source age procedures, for example, wind mill, Nuclear (Atomic) Energy, Geo-Thermal Energy, Tidal Energy, Hydraulic Energy, and so on. By including these vitality procedures we can utilize this framework for the modern reason and additionally can be utilized to build the power age limit.

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