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Design and Implementation of Smart Energy Management System

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ABSTRACT

This paper primarily discusses the monitoring of system of an integrated wind and solar energy system. This is achieved using the Internet of things. Wind and solar energy have become popular options for energy conversions over the past few years. So has increased the need for monitoring them over long distances. So this hybrid system can be utilized more efficiently. This increase in efficiency can lead to proper usage of the energy produced.

Keywords : Solar energy, wind energy, IoT, WiFi, Hybrid system.

I. INTRODUCTION

Energy crisis is the main problem on a day to day basis. Though there has been a great advancement in the energy field, perhaps there is still more which can be achieved to make it more efficient for its utilization .Here we make an attempt to provide monitoring to a power generation system using the internet of things. The IoT helps in monitoring the system by providing the detailed values of different parameters of plant over a dedicated IP address. This helps to maintain the plant over large distances by getting to know the values and thus maintain it to the desired levels. Since solar and wind are the most abundantly available forms of renewable energy. On an average ,India receives a solar radiation of 200mW.So there is plenty of opportunity to utilize this resource. Also , wind is available in abundance with solar in major parts of the country, making both an essential sources of energy ,which can be utilized together. Since both the energy sources are available in abundance ,they can be used in rural areas by people for generating lights in their homes. The initial cost might be high, but the running cost is low.

II. LITERATURE SURVEY

The paper presents a valuation of contradictory arrangements of Hybrid Energy Systems (HES) in islanding mode for isolated areas with a focus on explanations for isolated electrification which are mostly composed by one or a mixed of dissimilar energy bases and storage schemes. The paper analysis the widely used mathematical approaches for optimization, sizing and modeling of HES for quarantined electrification areas including the role of loading system. This paper also analysis the benefits and drawbacks of dissimilar solutions planned[1].

Renewable energy resources, energy has always been an main factor for socio-economic growth of humans. Most of the energy is produced from fossil fuels in the world. On the other hand ecological aspects and exhausting of fossil fuels causes increase of renewable energy operation. The produced energy from renewable energy resources are shifted to grid are used in separate systems. As energy generation depends on ecological conditions, efficiency and this energy possible of renewable energy systems changes

according to region of connection. Here overview of the solar-wind-battery hybrid system. Solar energy is becoming progressively popular day by day, so are grid-connected solar power generation schemes. This paper advises a solar power generation system with a seven-level inverter. DC-DC power converter is used to boost the output voltage of the solar panel. The capacitors of the capacitor selection circuit are charged with multiple relationships by the DC-DC power converter. These capacitors serve as input voltage sources for the seven level inverter. The output of the seven level inverter is fed into the utility grid such that the output current is sinusoidal and in phase with grid voltage.

The paper presents the design, execution, and estimation of a fuzzy logic (FL) organizer to control an alternating current (AC) synchronous motor's distributed reactive power (VAr), thereby refining the power factor (PF) of an manufacturing plant. The FL controller mimics the act that would be passed out by a human operator when altering the synchronous motor to supply the required VAr to accomplish the desired PF value. The controller provides elasticity with its nonlinear gain representative and adaptive action. The FL controller implements adequately under all test situations. The FL controller was sensed to perform successfully under both quickly and gradually fluctuating load situations. The FL controller show was extremely reasonable in tracking and refining the plant PF to reach the set point in a sensible time frame and motivated by the proportional integral derivative (PID) concept. The FL controller in mixture with a synchronous motor represents an innovative new method to the problem of PF development in manufacturing plants.

Reactive power to carry the entire scheme to the optimum working point is existing. The FL controller performs adequately together fast and slow changing load situation. The FL controller performance was extremely appropriate in chasing and refining the plant PF to succeed the set point. The FL controller in blend with a synchronous motor denotes a new practical method to take benefit of Renewable Energy Sources by vigorously testing plant electrical limits and automatically carrying the scheme to the finest effective point, and could some day be implemented in an manufacturing plant environment that may need PF improvement with a high degree of precision.

A power factor correction (PFC) topology with fuzzy logic controller (FLC) for light-emitting diode (LED) lighting uses is accessible in this paper. Nowadays, high illumination white LEDs becomes reasonable in domestic, manufacturing and commercial applications to exchange the incandescent bulbs, halogen bulbs and even compact fluorescent light (CFL) bulbs. Since LED lighting denotes a green technology, the issue of power factor is very significant. The performance of the proposed design will be analyzed in terms of power factor using the Matlab/Simulink simulation results.The paper presents a two-stage, single-phase power converter scheme fed from PV and Wind Turbine energy sources, and a new control methodology for moving the output power to the grid, leading to reduce harmonics in the grid current, and controlled power factor. The projected control depends on equating the total power from the renewable energy sources with the power required to supply the nonlinear load, leading to a controlled distribution of power requirement from the sources. A key outcome of the paper is that brilliant power factor and decent harmonic reduction is obtained from the view of the grid, with no condition for an intermediate battery due to the essential ability to provide leading reactive power to the grid when required. Simulation and experimental consequences are used to support the suggested control methodology.

This investigation is to formulate a pattern that will use Fuzzy Logic as a tool to control Synchronous

motor that will track and correct Power Factor of a plant. in the United States, Power Factor improvement is commonly done at the local (equipment) level or through the use of a huge capacitor bank, but this effort will address the solution using and suitably sized Asynchronous motor to match the plant in question. Several plant use synchronous motors in different areas of action, hence eliminating the cost of buying extra hardware. The synchronous motor will provide a smooth transitory and more exact proper value compared to capacitor bank when modifying the power factor. T he feasibility of three renewable sources has been studied. These three sources produce the power in dissimilar form such as AC or DC form. This power may not be steady due to environmental situations, but it's operation in proper way is done through hybrid charge controller. Energy generated by every separate source is important in hybrid energy systems, and combination of existing energy from these sources employed to drive load in very effective method.

III. OBJECTIVES

As per the load requirement so that it should justify the necessity of load. For calculating the battery bank size, we want to study the two factors. (a) Find total daily use in watt-hour (Wh) (b) Find total back up time of the battery.

The projected multi- Hybrid energy structure is the combination of two or more than two energy sources for giving power to the load. In other term it can defined as "Energy system which is planned to extract power by using two or more energy sources is called as the hybrid energy system." Hybrid energy system has good consistency, productivity, less production, and lower cost. Solar and wind are more beneficial than any other non-conventional energy sources. Both the energy sources have more availability in all zones. It needs lower cost. There is no requirement to find superior location to connect this system. The figure 1 shows the block diagram of the hybrid renewable energy scheme using wind, solar power and biogas plant. This block diagram contains dissimilar blocks such as: Solar PV, Wind turbine, Biogas Plant, Hybrid Charge Controller, Battery Bank, Inverter, AC Load, DC Load, etc.

IV. CONCLUSION

Hybrid renewable energy generation based on Solar PV and Wind lens. Here we had deliberated work described on hybrid renewable energy systems and their related controls founded on the survey of accessible literature. Because the output form wind and solar systems occur at diverse times of the day and year, hybrid structures are more probable to create power when we want it. According to many renewable energy specialists, a small "hybrid" electric scheme that combines wind, solar PV (photovoltaic) technology offer several benefits over either single system. The main benefit of hybrid system is that they create clean energy. Thus hybrid energy systems will meet the necessity of different energy sources in most operative, effective and cheap means.

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