

IOT BASED HYBRID POWER GENERATION SYSTEM USING WIND & SOLAR ENERGY

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Abstract - The rapid growth of technology and infrastructure has made our lives easier. In recent years we are facing the power cut problems due to increasing demand of electricity, due to the development of industrial automation that requires huge power. This project is used to generate the power by using different methods that can be stored in the battery. The battery is then discharged to power DC loads. In this project, we have focused on controlling of hybrid energy system using IOT. The microcontroller ensures the optimum utilization of resources and it also increases the efficiency of the combined system as compared to the individual mode of generation. It helps decreases in the dependence on one single source and makes the system more reliable. The hybrid system can be used for both industrial and domestic application.

Keywords- Hybrid System, Generated And Monitoring, IOT.

1.INTRODUCTION

The main objective of this paper is to design and to implement the hybrid power generation. This hybrid generation will provide electrical energy in areas where electrical grid is not reached yet and hence can light up many homes with affordable price. The renewable energy source generates electrical energy efficiently without any impact on the environment. Energy can neither created nor be destroyed but it can be transformed from one another form. There are two types of energy sources available, which can be used to generate the electricity. They are renewable and non-renewable energy resources. Nonrenewable energy resources are coal, nuclear, oil, and natural gases which are limitedly available, and the renewable energy resources are sunlight, wind, rain, tidal, waves and geothermal heat and this sources are naturally replenished on human timescale. Multinational company (MNCs) is also need certain megawatt (MW) interruption free power supply. This means that we may experience power cut much more than 60% in the short future. To compensate this power demand, power production through hybrid energy harvesting from piezoelectric material, solar panel vertical axis wind turbine and water turbine methods are used. Energy is more due to the rapid increase in world population, technologies and other political and economic condition. Now a day's electrical energy is generated by the conventional energy resources like coal, diesel and nuclear etc. And this are depleting day by day. So there is an urgent need to switch on to nonconventional energy resources at this point IoT plays an important role in controlling system the data is transmitted from power generation module wirelessly trough website to ESP32 module which monitors the source of energy. The transmitted data is monitored remotely using IoT in android cellphone and the result can also be displayed on LCD using microcontroller. In this project where user can monitor the how much voltage produced by each method of power generation by using Wi-Fi module. Solar and wind are easily available in all condition can be good alternative sources with the rise in the demand of renewable energy resources the need of better utilization of this system as aroused. This intern as given rise to the hybrid energy system. Hybrid energy system is the combination of two or more energy system. 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 electronics, software, sensor, and network connectivity that enable object to collect and exchange the data. IoT is used to switch the power supply i.e., wind energy and solar energy of a house through secure website and 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 consumer of electricity, it can be possible to control the source of energy of a house by this prototype.

2. DESIGN OF PROPOSED SYSTEM



Fig 1: Block Diagram of Proposed System

i. Solar panel : Solar panel is use to convert solar radiation to the electrical energy. The physical of PV cell is very similar to that of the classical diode with a PN junction formed by semiconductor material. When the junction absorbs light, the energy of absorbed photon is transferred to the electronproton system of the material, creating charge carriers that are separated at the junction. The charge carriers in the junction region create a potential gradient, get accelerated under the electric field, and circulate as current through an external circuit. Solar array or panel is a group of a several modules electrically connected in series parallel combination to generate the required current and voltage. Solar panels are the medium to convert solar power into the electrical power. ii.

ii. Wind turbine : Wind turbine is that system which extracts energy from wind by rotation of the blades of the wind turbine. Basically wind turbine has two types one is vertical and another is horizontal. As the wind speed increases power generation is also increases. The power generated from wind is not continuous its fluctuating. For

obtain the non-fluctuating power we have to store in battery and then provide it to the load.

iii. Charge controller: Charge controller has basic function is that it control the source which is to be active or inactive. It simultaneously charge battery and also gives power to the load. The controller has over-charge protection, short-circuit protection, pole confusion protection and automatic dumpload function. It also the function is that it should vary the power as per the load demand. It add the both the power so that the load demand can fulfill. And when power is not generating it should extract power from battery and give it to the load.

iv. Battery Bank : We have to choose battery bank size per the load requirement so that it should fulfill the requirement of load for calculating the battery bank size we need to find following data 1. Find total daily use in watt-hour (Wh). 2. Find total back up time of the battery For increase in battery bank size we need to connect cell in series so that we can get the larger battery bank size.

v. Inverter: We have to choose greater rating inverter than the desired rating .The pure sign wave inverter is recommended in other to prolong the lifespan of the inverter. Inverter is need to convert DC power into AC power. As our load working on the AC supply so we need to convert DC power. The input voltage Output voltage and frequency, and overall power handling depends on the design of the specific device

or the circuitry. The inverter does not produce any power. The power is provided by the DC source.

vi. IoT Module : An IoT board is designed to meet various application requirements with distinct advantages that help the embedded system designer too easily and quickly to enable internet connectivity to their applications. The module has an UART update feature and webpage control which makes it ideal for online wireless applications biomedical such as monitoring. environmental sensors, and datas from portable battery operated wireless sensor network device. This IoT board is featured with SIM900 GPRS modem which helps us to activate internet connection .It also has a controller to process all the input UART datas to GPRS based online data.

The output of the both solar and wind energy is connected to the battery through a charging circuit. The



charging circuit converts variable voltage to constant regulated voltage, thus functioning as an electric regulator. It includes a solar panel, wind turbine , charging circuit; rechargeable controller prevents the battery from being overcharged by the hybrid system. This is supported by the power management module which will keep account of the usage of the power stored in an efficient manner. When the battery is charged fully, the controller either stops or reduces the flow of current into the battery from the power generating systems. Since the output of the battery is DC, it can be directly connected to any DC load. For an AC load, an inverter is used for converting DC to AC and the battery is connected to an inverter board to convert generated DC into AC voltage.

As the solar panel contains photocells, when it is displayed in the daylight, these photocells convert the energy of light directly into 3Telectricity3T by the 3T photovoltaic effect3T. The solar array feeds of DC and peltier plate of DC to the rechargeable battery in this hybrid system. Thus, this system can be used at any time of the day. Generated DC is converted into AC by connecting the battery to an inverter board. AC appliances via step up transformer are switched on through this AC voltage feed.



Fig Power Supply

Generally, the stepdown transformers are used for converting high voltage into low voltage. It converts 230 volts into 12 volts according to the requirement of the circuit. It converts AC into DC. The fuse present in the circuit breaks the connection whenever a power fluctuation takes place, in order to prevent the circuit from damage. The bridge rectifier is used to provide the same output polarity for either input polarity. The filter is used for smoothing the ripples present in the single. An embedded circuit converts unregulated AC into a constant DC with a regulated power supply.



Fig Pin Configuration

3. ADVANTAGES

IoT gains more space in people's life.IoT is mainly used for tracking.The computers track information about varyious things using IoT.The amount of monitoring time is saved using IoT.Iot is used in various sectors like patient monitoring,home security etc.The IoT network saves time of the users as well as money.

4. APPLICATIONS

- i.Street lighting.
- ii.Traffic Signals.
- iii. Various monitoring systems.
- iv. Powering up for communication system.

v. Pump irrigation Systems.

vi. As per requirement of electrical energy the system can be either designed or updated for higher energy requirement.

vii. When ac mains supply is not available, the proposed system can be used as emergency system with only few changes.

viii. So, it can be used for almost every electronic, mechanic, viz. system needing/ require electric energy to work on.

5. CONCLUSION This paper proposes that with the use of solar concentrators and optical filters, energy wasted from the conversion of solar energy to electricity can be conserved and higher efficiency is achieved.

The educational institutions, furnace regions, industrial areas, malls and other locations are ideal for the



purpose of establishing such energy centres where the heatbeing dissipated are easily available for the recycling and conversion to the same system. The hardware is developed in such a way that the power is generated from two different sources that is from solar wind energy . These sources are combined to run the DC motor as well as AC motor. This module can be implemented in both private and public sectors. they can also be implemented in high renewable energy power plantareas to generate power gain. In this project we are creating hybrid power from two sources that is solar cell and wind turbine . Since solar panels cannot be used in the absence of sunlight, we are using wind energy along with solar panel. By this, we are generating power using hybrid source sand monitoring it with the help of IoT.

6. REFERENCES

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