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HOMERES (Hybrid Optimization Model for Electric Renewable Energy Sources)

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ABSTRACT:-In the present scenario, we are using coal, nuclear energy, hydropower plants, etc for electricity generation. Nuclear energy and coal cause high environmental pollution. In addition, demand for electric power is increasing day by day, so the best way to overcome these problems is to use renewable energy sources to produce electricity. The future depends on renewable energies. In this project, we focus on an integrated hybrid renewable energy system consisting of wind and solar energies. The objective of our project is to effectively utilize a combination of solar and wind renewable energies for electricity production. The naturally available renewable energies are solar and wind energy and we can freely use these energies. Renewable energy sources are the best options to fulfill the energy demand but are unpredictable due to natural conditions. The conventional system provides the use of either solar or wind energy alone. But this hybrid power generation system will provide solar or wind or both as per the availability. In our system, solar panels provide maximum tracking of the sun whenever there is the availability of sunlight and store maximum energy in the battery and here vertical axis wind turbine. A wind turbine is designed as even a small amount of wind can generate maximum output. The main advantage of this project is, it can use solar or wind energies alone as well as together as per the availability of the resources. In this project, we are using clean energy. This project is more convenient and this will be the nearest future.

Keywords- Hybrid renewable energy system, solar energy, wind energy.

I. INTRODUCTION

India is the 3rd largest energy producer in the world, as well as India, is the world's largest energy consumer also. So there occurs the need for finding alternative ways for energy production and effective utilization of energy resources available, by adopting such methods we can mitigate the impact of deficiency of energy. We are recipients of several renewable energy resources. Nowadays different technological movements are arising for the utilization of renewable energy sources. Rooftop PV installation is common nowadays and also windmill system is improvising as time passes. A hybrid model for such energy sources is also familiar to us. But in the present scenario, it is important to put forward methodologies which is the maximum effective and efficient for utilization of the same[4]. Here we are introducing an integrated model of solar energy and wind energy in which both sources are utilized at their maximum. For effective utilization, we have adopted an automatic tracking system for the PV system. It will help to rotate the panel by the intensity of light the LDRs placed on the PV system will measure the intensity of light and helps to tilt the panel towards the sun. So, by integrating this technology we can use maximum solar energy and the wastage of energy can be minimized [1][6]. For the effective utilization of wind energy, we have adopted a savonious wind turbine system. It is because savonious wind turbine does not much depend on wind speed and wind direction, which is much more efficient than the conventional systems [2]. So, the integration of two efficient models for the utilization of wind and solar energies will be a helping hand toward the increasing demand for energy usage in India. India is a recipient of different energy resources. So, for solar energy and wind

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energy, this proposed model HOMERS will be effective to the plenty available of the same. The introduction of the hybrid system in a public place for domestic purposes can limit the energy usage from the conventional grid system and thereby decrease the energy production demand In India, there are still many rural areas which do not expose to an uninterrupted power supply. The energy source at those places can be utilized. The energy source at those places can be utilized by implementing the hybrid-electric model. This model will provide energy when both sources are available and also when only one of the energies is available. In short, HORMERS will provide a continuous supply of energy at any time [4][7][3].

II. PROPOSED SYSTEM

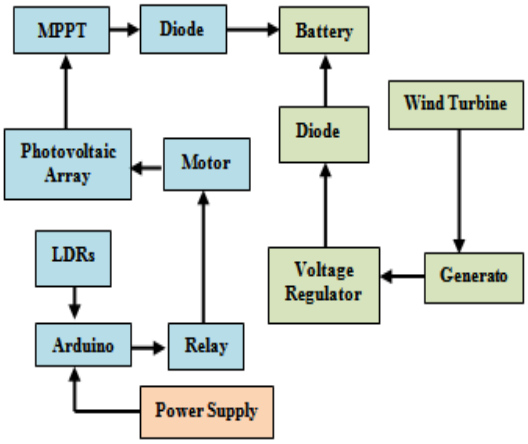

Fig 1: Basic Block Diagram of Proposed System

A. COMPONENTS

1. Solar Panel
2. Relay
3. MPPT
4. LDR
5. Arduino
6. Turbine system
7. Voltage Regulator

1. Solar panel

Solar Panel converts the solar energy into DC power by using the photovoltaic effect. Solar cell is the building block of a solar panel and cascaded in series inside a solar panel. Multiple solar panels together make solar panel array[1][4].

Table 1: Specification of Solar Panel

Name	Rating
Rated Maximum Power	50W
Peak Voltage	17.20V
Peak Current	2.91A
Open Circuit Voltage	21.60V
Short Circuit Current	3.23A

2. Relay

Relays are electrical switches which can be turned on or off and thus allow current to flow through the circuit or not. Two channel 5V relay is used [1].

3. MPPT

MPPT (Maximum Power Point Tracker) is used as solar electric charge controllers. MPPT used to regulate battery charging process, Which ensures the battery charged correctly [1].

4. LDR

Light Dependent Resistors are devices that work on the principle of photoconductivity. That is when the intensity of light increases resistance will decrease and hence the conductivity increases. The resistance is inversely proportional to intensity of absorbed light [1].

5. Arduino

Arduino UNO is an easy to use and flexible open source microcontroller board based on the microchip ATmega328P microcontroller. It has 6 analog input/output pins and 14 digital input/output pins [1].

6. Turbine System

Here we use a vertical axis wind turbine system called savonius wind turbine. It has the ability to operate at low wind speed. As a result it can produce maximum voltage at low wind speed [2][4].

7. Voltage Regulator

Voltage regulator is a device used for maintaining a constant voltage for the power source used. It will be within the acceptable limit provided in the power source [4].

B. WORKING OF PROPOSED SYSTEM

The hybrid power generating system generates electricity from both solar energy and wind energy. The solar energy is converted into electrical energy by the operation of solar panel system. Automatic solar tracking is obtained by the LDRs placed on the panel. Here when the light is falling on the panel the LDRs placed on both sides will detect the intensity of light and resistance of the LDR will decrease when more light is incident on it. The output from the LDRs are then given to Arduino and it executes predetermined task in its software and tilt the panel towards the sun. Maximum power point tracking method is utilized here in order to track the maximum energy point [1]. And a diode is given

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before the battery for preventing the backflow of energy from battery to system itself. For the conversion of wind energy to electricity windmill system is utilized. The output from the windmill system is given to motor and then after the motor we are giving a diode for preventing the backflow of energy [5]. Both energies are stored in the battery.

Fig 1: Prototype

III. CONCLUSION

In this present world with rampant productivity energy plays an important role which the whole civilization depends. The gradual increase in the population will strike on the day to day energy demand. So it is necessary to take down this problem by the implementation of advanced technologies. As it says that energy can neither be created nor be destroyed the energy should be stored somehow therefore energy can be supplied continuously. The effective utilization of renewable energy sources will be an efficient alternative to blow off the increasing demand of energy. The hybrid power generating system uses both solar energy and wind energy so that the chance for the availability of anyone energy is high. And here we have implemented an automatic solar tracking system which will helps to face the solar panel always towards the sun and the savonius model wind turbine helps to produce energy independent of wind speed and direction since it will rotates even in small wind speed. Thus the hybrid system introduced has incorporated techniques which can utilize both the energy maximum. It can be used for both domestic and commercial purposes. The pollution level of this hybrid system is much less than the other systems. So it will also helps in the process of healing the world through utilization of natural resources. HOMERES will be an efficient tool to overcome the scarcity of energy and it introduces an environment friendly energy generation system [4][1][2].

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