

Smart Solar Tracker and Energy Measuring System

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Abstract— Renewable energy is a valuable source as it makes a remarkable impact to the society. It makes a great impact not only in the life of urban areas but mainly in the life of semi-urban and rural areas. The power developed from solar energy is basically the energy extracted from the sun rays. Solar panels made up of solar cells are used to convert the solar energy into electrical energy. Solar cells or Photovoltaic cells are semiconductor diodes that convert sunlight to electrical energy. This is achieved by placing the solar panel towards the irradiation of the sun. But the solar panel remains stable in one direction, while the position of the sun changes throughout the day due to rotation and revolution of the earth. As the panel does always not face the sun it cannot produce maximum electricity and hence is less efficient. In this proposed method the panel would track the movement of the sun which will maximize the efficiency. The energy consumed and saved will be uploaded on cloud which would be available to the user.

Keywords— Irradiation, Photovoltaic

I. INTRODUCTION

Solar energy is one of virtuous source of renewable energy. During the present time the popularity of solar energy is increasing on a large scale and hence we use it in the households as well as industries. But still it seems that it is still very expensive compared to the charge of the electricity that is charged by the electric utility company charges per kilowatt hour.[4]

The sun changes its motion throughout the day because of the rotation and revolution of the earth. The conventional or current method does not track the movement of the sun. Because of this the efficiency obtained is quite less. In order to ensure the maximum use of the solar energy and to increase the efficiency of the system this new method is developed. Smart solar Tracker is a device that can move towards the sun all day long. Solar energy can be defined as the energy extracted from the sun in the form of heat that gets converted to electricity. Photovoltaic cells are basically semiconductor diodes, these are responsible for the energy conversion. There is needed to also keep a check on the energy generated by the solar panel and the energy consumed. This is done by the energy measuring system. The amount of energy generated and stored as well as the amount of energy consumed is measured. This data is also made available to the user, so that a user can keep a track on the performance of the solar panel.

Smart tracker aims to provide an innovative way to increase the efficiency of the solar panel and ensure maximum

usage of the solar energy. As the existing system did not track the movement of the sun, also it did not maintain any records of the energy being saved and consumed. The process of collecting the data using sensors and storing as well as displaying the same is called as Automatic Meter Reading (AMR). This technique can be very useful in hugely populated countries such as India. In India employees are hired to go from house to house and collect the reading from the energy meters. India uses a slab-based model of pricing to charge the customers for the usage of electricity.

This method is basically used in order to reduce the burden on the poor people. But if ever an error occurs in this process then it can cause a huge loss to the companies providing power. In order to reduce this risk Automatic Meter Reading can be used, it can also be called as the cheap solution. It also prevents the manual labour required to collect data of each meter. The vital thing behind this approach is that it increases the efficiency of the conventional panel as well as it provides a cheap solution for reducing the manual labour and the possibility of error in the manual labour.

II. LITERATURE SURVEY

Much research has been done in order to maximize power generated from solar panel as Renewable Energy is one of the needs now a days.

Aashish Tiwari, Mayuri Vora, Prajka Shewate, Vrushi Waghmare have presented a new approach by which the energy efficiency of the solar panel increases as we implement dual axis tracking. In the dual axis tracking maximum irradiance can be obtained on the solar panel thus more will be current generated from the panel.[1].

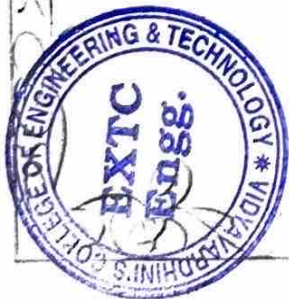
A Kaseem and M. Hamad have presented a new approach. The PV systems basically consists of PV arrays that converts radiations to electrical energy and the inverter converts the dc energy obtained from the PV array into AC which can be used to run home appliance such as TV, radio etc. The energy from the PV array can be fed back to the grid or can be fed to a battery which can act as a storage media in case of power outage. The solar inverter is microcontroller based, it uses a microcontroller based driver, switching circuit, setup transformer & filter. The microcontroller-based driver generates PWM signal. This signal has a fixed frequency and duty cycle. [2]

A. C. D. Bonganay, J. S. Magro, A. G. Marcellana, J. M. E. Morante and N. G. Perez proposes a model which

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