AUTOMATIC SOLAR TRACKER

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Abstract – *Solar energy has been in stay for long now. It has become one of the most mainstreamed power generation method in recent times, Solar panels have being installed all over the globe on large number. Since the sun energy is available for limited time during the day and continuously changes its position, the panel donot yield power at maximum potential every time. Hence with this project we plan to introduced dual axis solar tracker system capable of following the suns position continuously with the help of 4 photodiode sensors and motors.*

***Key Words*: — photodiode sensors, dc motor, solar panel, dual axis.**

1. INTRODUCTION

Electrical energy from solar panels is derived by converting energy from the rays of the sun in to electrical current in the solar cells. The main challenge is to maximize the capture of the rays of the sun upon the solar panels, which in turn maximizes the output of electricity. A practical way of achieving this is by positioning the panels such that the rays of the sun fall perpendicularly on the solar panels by tracking the movement of the sun. This can be achieved by means of using a solar panel mount which tracks the movement of the sun throughout the day. Energy conversion is most efficient when the rays fall perpendicularly onto the solar panels. Thus, the work is divided into three main parts namely the mounting system, the tracking controller system and the electrical power system. In solar tracking systems, solar panels are mounted on a structure which moves to track the movement of the sun throughout the day. There are three methods of tracking: active, passive and chronological tracking. These methods can then be configured either as single-axis or dual-axis solar trackers. Inactive tracking, the position of the sun in the sky during the day is continuously determined by sensors.

The sensors will trigger the motor or actuator to move the mounting system so that the solar panels will always face the sun throughout the day. This method of sun-tracking is reasonably accurate except on very cloudy days when it is hard for the sensor to determine the position of the sun in the sky thus making it hard to reorient the structure. Passive Tracking unlike active tracking which determines the position of the sun in the sky, a passive tracker moves in response to an imbalance in pressure between two points at both ends of the tracker. A chronological tracker is a timer-based tracking system whereby the structure is moved at a fixed rate throughout the day. The theory behind this is that the sun moves across the sky at a fixed rate. Thus the motor or actuator is programmed to continuously rotate at a “slowaver age rate of on revolution per day (15 degrees per hour)”.

This method of sun- tracking is very accurate. However, the continuous rotation of the motor or actuator means more power consumption and tracking the sun on a very cloudy day is unnecessary. A single-axis solar tracker follows the movement of the sun from east to west by rotating the structure along the vertical axis. The solar panels are usually tilted at a fixed angle corresponding to the latitude of the location. According to, the use of single- axis tracking can increase the electricity yield by as much as 27 to 32 percent. On the other hand, a dual- axis solar tracker follows the angular height position of the sun in the sky in addition to following the sun’s east-west movement reports that dual-axis tracking increases the electricity output as much as 35 to 40 percent.

1.1 Problem Identification

Solar energy is not being utilized at its highest potential. Given the high initial cost of panels and its installation, the return on investment period is very long. Requirement of solar panel for given amount of electricity output is more. Solar panels are installed in an open space, which is prone to dust and dirt collection directly.

Cleaning a solar panel is a risky task in case of bigger plants. Due to brittleness of glass and slippery surface or external atmosphere.

1.2 Scope

The solar panel will adjust itself perpendicular to the sun rays, which will guarantee more wattage output for full daytime. The quantity of solar panels required for same output generation will be reduced, since it will always be in perpendicular. They will generate more electricity in roughly the same amount of space needed for fixed tilted systems. It will have positive impact on the economy of the premises. Since, more wattage means more illumination load and also less payback (return on investment)period.

2. METHODOLOGY

This is where the necessity for solar tracking comes in. Solar tracking is not a new concept, though it is a considerably new concept compared to PV cells. Patents began to be filed in regards to solar tracking, and even before that regarding simple light sensing technology, soon after the commercial availability of efficient PV panels hit he market: about50yearsago. Like most technology today, a large collection of solar tracking systems exist, ranging in price, effectiveness, reliability, etc. The design options for a solar tracking system must be taken into careful consideration to ensure that the system is maximizing its output from tracking the sun. If key aspects of the application needs were to be neglected, the solar tracker could actual under-perform a well-positioned stationary PV panel. Here we constructed for the dual axis solar tracker.

It consist of two axis structure in order to rotate the solar panels vertically as well as horizontally. The DCmotors are coupled with the panel with the help of gear mechanism. The 2 photodiode sensor are placed in pair at each corner of the panel. The photodiode sensor are so placed as to face the sun rays every time on at least one side. The surface surrounding the axis of the solar panel needs to be kept free in order to facilitate the easy movement on both axis. The motor driver and power supply circuit is placed in a circuitry box. A transformer 230/12 v outputs the 12v AC output. It is then converted to the DC output with the help of rectifier diode. A 7805 IC convertsthe12vDCto5vDC.Thesmoothingcapacitor of 1000uF I provided to provide pure DC voltage output by removing the ripple content in the output. A 5 v power supply is provided to the microcontroller, motors and sensor modules each.

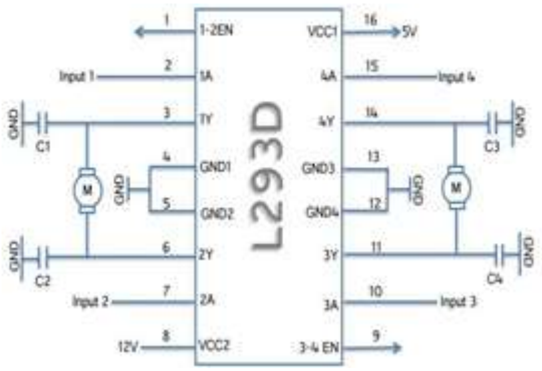

Fig -1: Circuit Diagram

ThisFigno1showsthehowwearecreatingthecircuit of our project. Due to which over all project will be run. By using this way we are use the pins of components. There is separate power supply is connected of 5v.by using this circuit we run this project.

Fig -2: Hardware components of project

Then by using the protius software we draw the circuit diagram and by using express PCB software we draw the schematic diagram.

Then as per schedule we had done the soldering of different components by using data sheet.

Those are the hardware components used in this project in that following are the main components.

- DC motor
- L293d motor driver
- Sensors
- Solar panel

3. CONCLUSION

In our project we studied about solar panel and its tracking. In the present system, solar panels used are stationary which gives less output and hence decreases efficiency. We have tried to make an automated solar tracking system which will increases the 30-40% efficiency of the solar panel system.

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