

Movement of the Dual-Axis Solar Tracking System

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ABSTRACT

Nowadays biggest problem world is facing is energy crises and fossil fuel price is very high also this fuel is in limited amount so that's why renewable energy is main factor in 21st century. There are various sources of renewable energy like wind, sun and geothermal but cheap energy source is solar energy. in this paper we try to tell that that solar tracking system gives more efficiency and more power than fix solar panel so this system we can implement in every solar panel and try to get maximum benefit of the solar energy.

Keywords:-*Single axis and dual axis tracker, ldr sensor, solar plate, Arduino*

INTRODUCTION

In remote areas the sun is a cheap source of electricity because instead of generators it uses solar panel to produce electricity.

The performance of solar cells depends on the intensity of sunlight and different angles of sunlight at different times.

It means achieving maximum efficiency. The solar panel should be placed in a place where the sun shines all day long. However, because the Earth's plates rotate, they cannot always change their position in front of the Sun. This problem reduces the efficiency of the solar panel.

Therefore, an automated system is required to constantly rotate the solar panels for constant performance. The Automatic Solar Tracking System (ASTS) was developed as a prototype to solve this problem. Using a solar tracker can increase power generation by about a third compared to fixed angle modules, and up to 40% in some regions.

In any solar application, the efficiency of the solar panel increases as it rotates with the movement of the sun.

Increased efficiency means increased yield, so the use of trackers can have a significant impact on yield in large-scale facilities.

Solar Tracking System

Sun moving all time in the day that's why we make two type of tracking system based on requirement. Single axis solar tracking system. Dual axis solar tracking system

Single Axis Solar Tracking System

Single axis solar trackers can either have a horizontal or a vertical axle.

A single-axis tracker takes single degree of freedom that turns as per the axis of rotation. Using a single-axis solar tracker can increase power generation by up to 27%-32%.

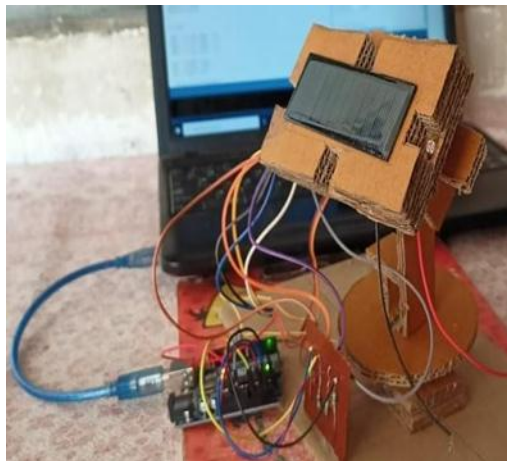


Dual Axis Solar Tracking System:

A dual-axis solar tracker has two axes of rotation: a vertical axis and a horizontal axis. Its ability to follow the sun provides maximum solar power generation. A dual-axis solar tracker has both horizontal and

vertical axes, so you get 30-40% more power than a fixed panel.

A 2-axis tracking system is more complex than a 1-axis system, but provides better output than a 1-axis system.



COMPONENTS

LDR Sensor

A passive electronic component, a light dependent resistor or photoresistor, is basically a resistor whose resistance

changes depending on the intensity of light. When sunlight hits the LDR, it turns the servo motor, which in turn turns the solar panel.



Arduino board

Arduino uno board is used to implement the code in Arduino ide and also to provide power to servo motor.



Servo motor Sg90:



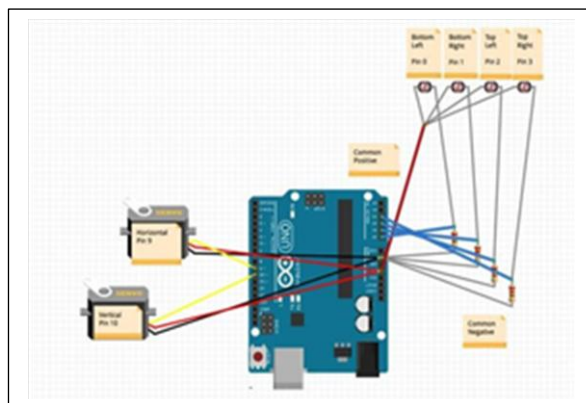
A servo motor stands a rotatory or else linear actuator that specifically switches angular or linear position. I used a SG90 servo motor to rotate the solar panel 180 degrees or a few degrees.

Solar Plate

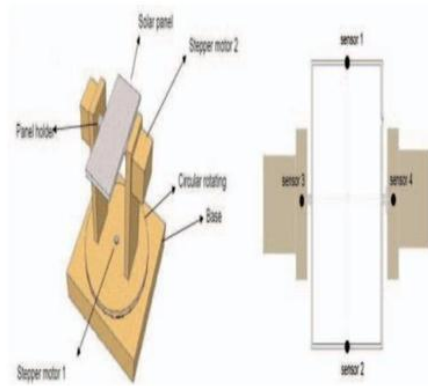
Solar panels, sometimes also called photovoltaics collect **energy** from the Sun in the form of sunlight and convert it into electricity that can be used to power homes or businesses. These panels can be used to supplement a building's electricity or provide power at remote locations



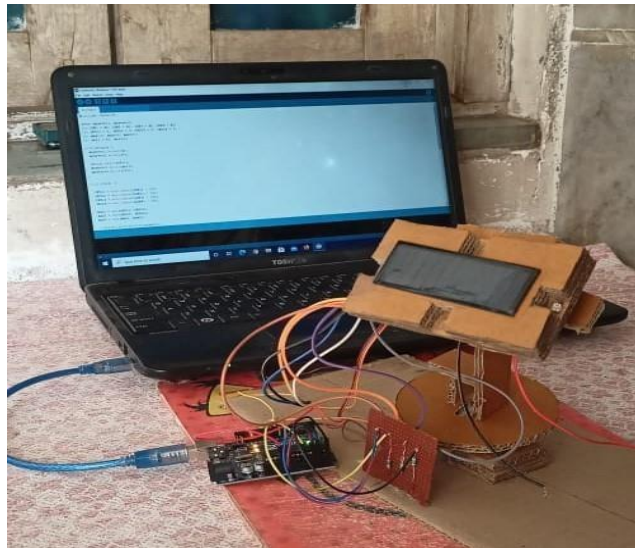
**Block Diagram
Dual Axis Solar Tracking System**



Hardware Model



Complete Setup of Dual Axis Solar Tracking System



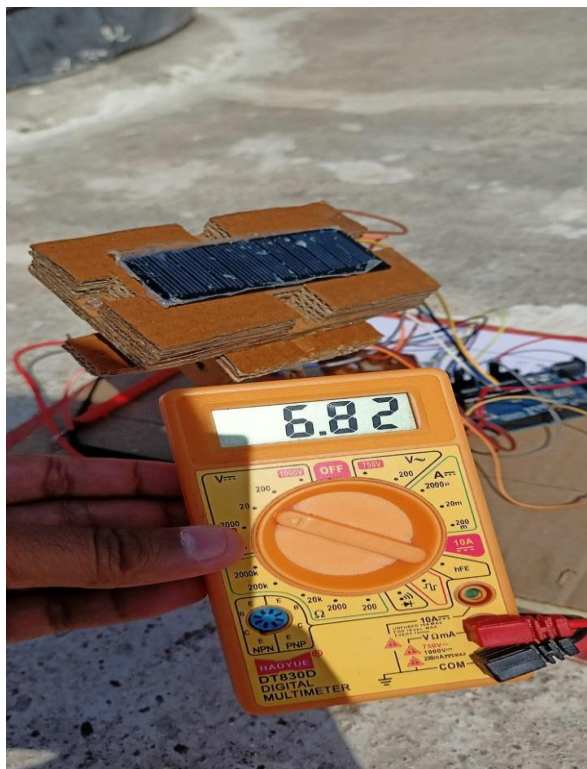
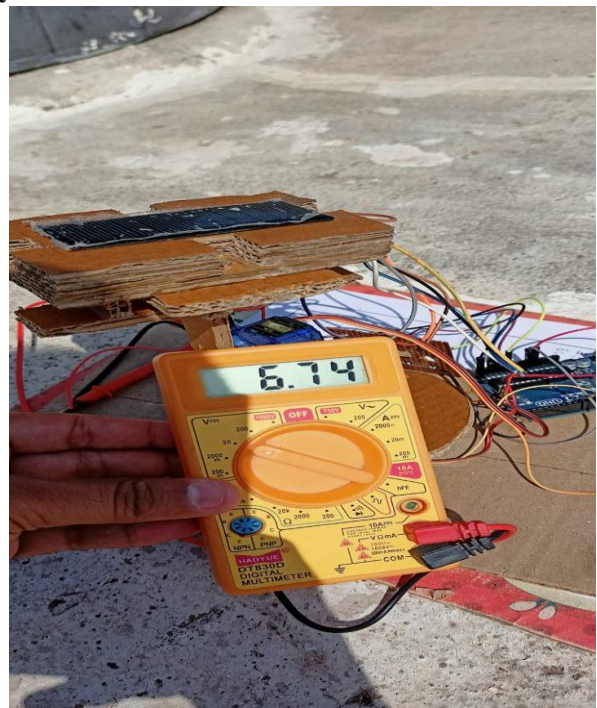
RESULT ANALYSIS:

Fix panel

solar tracker

Time	V voltage	Time	V voltage
9:00AM	3.9 V	9:00AM	6.4 V
11:00AM	5.56 V	11:00AM	6.44 V
1:00PM	6.3 V	1:00PM	6.82 V
3:00PM	4.5 V	3:00PM	6.74 V
5:00PM	2.9 V	5:00PM	6.4 V

Result Analysis of Dual Axis Solar Tracking System



APPLICATIONS

- ❖ Dual axis sun tracker can be used for large & medium and also for small size applications.
- ❖ It can be used in solar street light
- ❖ For power generation at remote places where power lines are not accessible.
- ❖ It can be used in vehicles for battery charging.
- ❖ This system used in every home application like to get heat water, provide power to AC, fridge, every electronics item.
- ❖ This structure software besides hardware can be recycled to work factual and extensive solar panels.

ADVANTAGES

- Solar trackers are highly and well maintain installations. The manufacturing costs of this system is little bit high but once the initial investment of building a solar power plant has been spent we get maximum return.
- The main advantage of using solar tracker is that it increases the availability of solar power from a location.
- Solar tracking system improve efficiency of the solar plate and get more 30-40% output compare to fix solar panel.
- This system produce the clean emission free power which will not affect environment.

DISADVANTAGES

- Initial investment is high on solar panels
- Moving parts of the structure will require regularly maintenance.
- Dual axis is more expensive than single axis.
- This system will not work in rainy season.

FUTURE WORK

In this project we can increase the sensitivity and accuracy of tracking by

using different type of light sensor. A phototransistor with an amplification circuit would provide improved efficiency and better tracking accuracy. We can fit this system in the solar car so it will improve power and speed of the car.

CONCLUSION

Purpose of this project is to get 30-35% more power than fix panel as we saw in this paper. From research we also found that dual axis is more costly than single axis system but dual axis is more powerful and more efficient than single axis system.

Concept in designing a solar tracker system applied to solar panel has been presented in this article. The result of solar tracker system design for solar panel consist of system display design, hardware design. The article shows the benefit of the dual-axis sun & single-axis sun tracker system compared to a fix panel. A dual-axis tracking system produces 30 % power than fixed photo module. Switching to solar power, which is clean and green and enhancing its efficiency by using sun trackers is better option in the future.

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