

Shri. Chhatrapati Shivaji Maharaj College Of Engineering, Nepti Ahmednagar

"Tracking of Solar Panel by Hydraulic System"

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Deperment of Mechanical Engineering.

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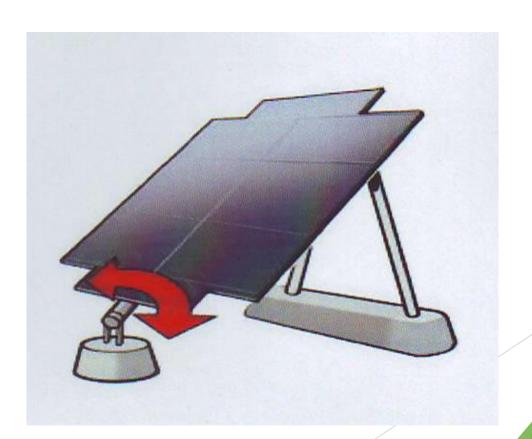
INTRODUCTION

Energy from the sun travels to the earth in the form of electromagnetic radiation similar to radio waves, but in a different frequency range called solar energy. Solar power is the conversion of received solar radiation into usable energy.



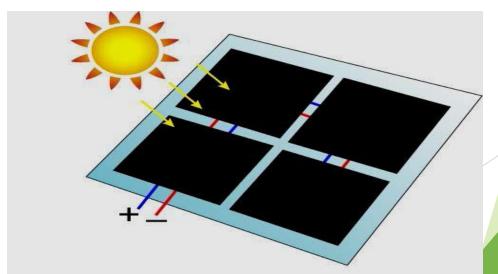
Solar Tracking

Solar tracking is the process of varying the angle of solar panels, to take advantage of the full amount of the sun`s energy.



OBJECTIVE OF PROJECT

The position of the sun keeps on changing every day. Solar panels as we know are entirely dependent on the sun. The more the sun rays fall on the panels the more outcomes we get and it serves our purpose of installing a solar panel. The challenge nowadays is to keep a track of the position of the sun so that we get the maximum output from the panels. We hope to achieve this with a Mechanical tracking system.



LITERATURE SURVEY

Ankit Anuraj, Rahul Gandhi, "Solar Tracking System Using Stepper Motor",

Volume 7, Number 6 (2014), IRPHouse

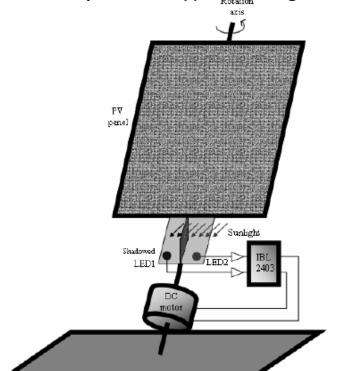
Design and construction of a prototype for solar tracking system with single degree of freedom, which detects the sunlight using Light Dependent Resistors (LDR). The control circuit for the solar tracker is based on an ATMega16 microcontroller.



Tiberiu Tudorache, Liviu Kreindler, "Design of a Solar Tracker System for PV PowerPlants" Vol. 7, No. 1, 2010, Acta Polytechnica Hungarica

The proposed single axis solar tracker device ensures the optimization of the conversion of solar energy into electricity by properly orienting the PV panel in accordance with the real position of the sun. The operation of the experimental model of the device is based on a DC motor intelligently controlled by a

dedicated drive unit that moves a mini PV panel according to the signals received from two simple but efficient light sensors.



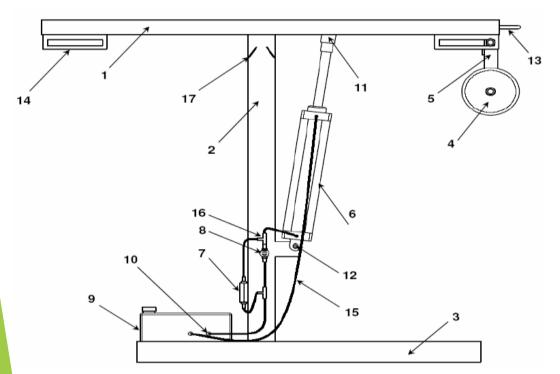
PROBLEM STATEMENT

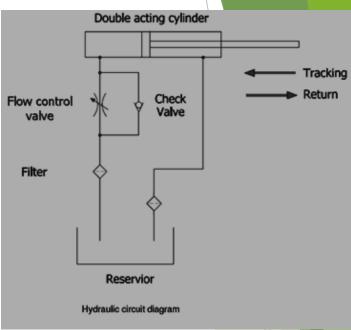
At present, the solar tracking system use electrical energy for tracking operations and this electrical energy for operations is supplied by same solar panels or by external electrical storage or supply lines, this reduces efficiency of the solar panels. Using mechanical energy for tracking will increase the output of solar panels and remove the constraint on the location of the tracking system.

METHODOLOGY

- ► Step 1:- Identification of problem
- ► Step 2:- Literature Survey
- ► Step 3:- Setup Layout & Component Design
- ► Step 4:- Brought our material.
- ► Step 5:- Manufacturing processes.
- ► Step 6:- Trial of tracking

WORKING PRINCIPLE



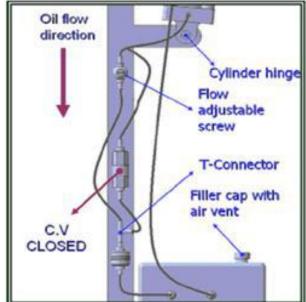


Working of tracking of solar panel by hydraulic system

Tracking

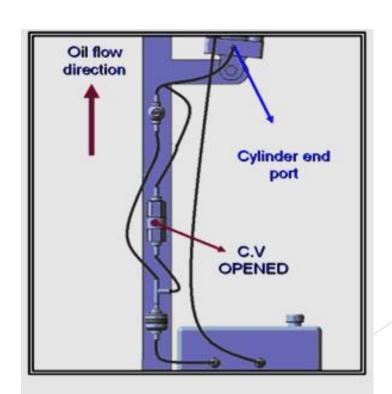
As the tracking weight acts on the piston through piston rod, it pushes the oil out of the cylinder and the oil flows towards reservoir. While, due to the restricted cross sectional area at flow control valve the piston moves with the velocity equal to calculated tracking velocity. During this action the check valve remains closed, hence oil is allowed to flow only through flow control valve. At the rod end of the cylinder, the oil is sucked into cylinder due to the vacuum pressure created by the

applied weight.



Return

As the tracking time finishes, the panel seat has to be rotated by applying the torque, manually, to bring back into initial position. The vacuum pressure is created at piston end chamber and oil from reservoir rushes towards cylinder. As soon as the system pressure exceeds the cracking pressure of check valve, check valve opens and allowing full flow of oil from it, reducing the time required for repositioning operation.



ADVANTAGES

- 1. Hydraulic solar tracker is easy to design and manufacture compare to other tracker system.
- Increased reliability of hydraulic control system compared with other solar tracker.
- Hydraulic solar trackers generate more energy than other tracking system like electric solar tracker.
- Lubrication of system is not necessary due to less moving parts.
- Compare to other tracking system hydraulic tracking system cost is less.
- 6. Important reduction of whole life maintenance cost of solar tracker.

DISADVANTAGES

Required manual power to pump the oil in cylinder.

CONCLUSION

It is observed that the designed mechanical tracking system is a system, which consumes no energy for operation and contributing towards increasing the productivity of the solar panels. In view of increasing demand for the electrical power, this tracking system can contribute a little in the fulfilment this demand

References

- 1. Ankit Anuraj, Rahul Gandhi, "Solar Tracking System Using Stepper Motor", Volume 7, Number 6 (2014), IRPHouse
- 2. Tiberiu Tudorache, Liviu Kreindler, "Design of a Solar Tracker System for PV PowerPlants" Vol. 7, No. 1, 2010, Acta Polytechnica Hungarica
- 3. Prof. Kusekar S. K, "Design and Development, Solar Tracking System, Hydraulic System", Volume 2 Issue 8 April 2015, IJIFR

THANKYOU