

SOLAR RADIATION TRACKER SYSTEM

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Abstract – In this paper we have proposed a system that controls the movement of a solar panel so that it is constantly aligned towards the direction of the sun. The following document is the research and development of Solar Radiation Tracker System.

Fossil fuels are comparatively short-term energy source, the uses of alternative sources such as solar energy is becoming more popular. To make solar energy more reliable, the efficiency of solar array systems must be maximized.

The Solar Radiation Tracking System is a hybrid hardware/software prototype, which automatically provides best alignment of solar panel with sun, to get maximum output (electricity).

Keywords— solar tracker, dual axis, Light depending resistor (LDR), Servo-motor, single axis

1. Introduction

The need for improving the power generation is increasing day by day. The acquiring process for energy and power depends on various factors. In the field of solar power major factors are overall efficiency that include solar cell efficiency, intensity of source radiation and storage techniques, power consumption. The materials used for manufacturing of solar cells limit the efficiency of a solar cell. This creates a hurdle in the performance of the cell, and hence restricts the efficiency of the overall storage and consumption of power.

Therefore, the smartest method of improving the performance of solar power collection is to track the radiation from the Sun.

1.1 Need of Sun Tracker

If we could get a solar cell to turn and look at the sun all day, then it would be receiving the maximum amount of sunlight possible and converting it into the more useful energy form electricity. But as sun rises in the east goes across and sets in the west, so it is very difficult for a human being to watch and turn the solar panel in the direction of sun. That's why we have made an automatic system which will accordingly gets aligned in the

direction of sun to acquire maximum energy. And this type of system is known as Tracker.

1.2 Objective of Work

A light sensor is employed to control the solar cell tracking system. For example, As the light falls on the LDR it will give the signal to the microcontroller and microcontroller will sense the signal and turns the respective axis motor ON and the panel would aligned accordingly facing towards the sun. Motors are attached to the frame, where the frame holds the solar panel and on the panel there will be 4 LDR's attached. LDR's are placed on each corner of the frame top left, top right, bottom left, bottom right.

One motor will provide vertical motion of frame i.e. up and down another motor will provide horizontal motion of the frame. This is how the model will track the sunlight and accordingly works.

2. About the Setup

The setup is designed such that it could hold the solar panel and can rotate it easily. The frame is built on a wooden platform. The frame is made of aluminum angles, as it is lightweight and strong. The frame is attached with 2 motors as explained earlier, one for horizontal and one for vertical motion. These motors are connected with microcontrollers. Solar panel thus gets charged as it gets aligned and gives power to the battery. Battery is used for storage purpose and it also provides power to run the microcontroller.

We have also provided an alternative that is if battery could not gets charged or if there is a cloudy weather and sunlight is less so a connector is there through which 5V adaptor can be connected to run the system.

The most important goal of our project is power conservation. To achieve that we are storing the electrical power in the battery, which will be charged by solar panel and then this battery will provide power to our electrical circuit.

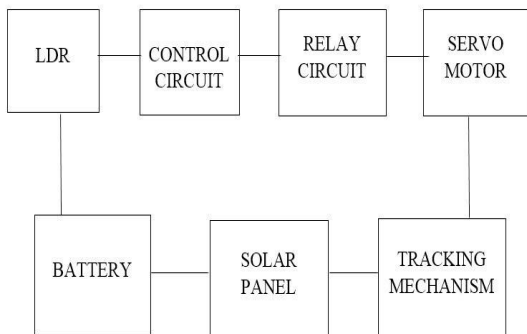


Figure 1 and 2- Initial setup of FRAME



fig 3 final setup of the project

2.1 Block Diagram



Explanation of Block Diagram

The tracker totally depends on the availability of the light. As the light falls on the LDR the LDR gives signals to the microcontroller. Microcontroller and relay circuit will sense the signals and in return makes the motors active. The tracking mechanism is basically on which LDR the light falls will makes the particular motor to rotate. Thus the Solar panel placed on the frame will be aligned towards the sun and gets charged. Then this charged energy would be stored in the battery. After that the stored energy will be used to run the setup again. This is how the cycle of charging and storing of battery will continue till the presence of light.

3.Conclusion

Dual axis tracker perfectly aligns with the sun direction and tracks the sun movement in a more efficient way and has a tremendous performance. The experimental results clearly show that dual axis tracking is superior to single axis tracking and fixed module systems. We have used servomotor instead of stepper motor, as it was less expensive. The main purpose of using 2 motors was just in case if one motor stops working then also the system can run. The proposed system is cost effective also as a little modification in single axis tracker provided prominent power rise in the system. Through in our experiments, we have found that dual axis tracking can increase energy by about 50% of the fixed arrays. With more works and better systems, we believe that this project can raise more.

4.Acknowledgments

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5.References

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