

Solar Tracker

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Abstract: Solar Power generation had been used as a renewable energy since year ago. Solar power as their alternative power supply will being benefit to them. This system tracks the maximum intensity of light. When the intensity of light is decreasing, this system automatically changes its direction to get maximum intensity of light. LDR light detector is used to trace the coordinate of the sun. while to rotate the appropriate position of the panel, servo motor is used. An Arduino as a main processor. This project is covered for a single axis. Finally, the project is able to track and follow the sun intensity in order to get maximum power. A variety of techniques of solar energy production used have proven that up to 30% more solar energy can be collected with a solar tracker than with a fixed solar plate system.

I. INTRODUCTION

Now a day's generally, solar panels are stationary and do not follow the movement of the sun. Hence the maximum power is generated from sun light when the solar plate is perpendicular to the sun. But other time the very few amount of sun light is converted into voltage.

To overcome this problem here is a Solar Tracking system that tracks the sun's movement across the sky and tries to maintain the solar panel perpendicular to the sun's rays, ensuring that the maximum amount of sunlight is incident on the panel throughout the day. The sun tracking solar plate starts following the sun right from dawn, throughout the day till evening, and starts all over again from the dawn next day.

Component- Servo motor resistor

- Servo Motor
- Resistor
- LDR
- Solar Panel
- Arduino
- PVC pipe
- Screw
- Plywood

Servo Motor-

A servo motor is a rotary actuator or a motor that allows for a precise control in terms of the angular position, acceleration, and velocity. Basically, it has certain capabilities that a regular motor does not have. Consequently, it makes use of a regular motor and pairs it with a sensor for position feedback.

Resistor-

A resistor is a passive two terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits

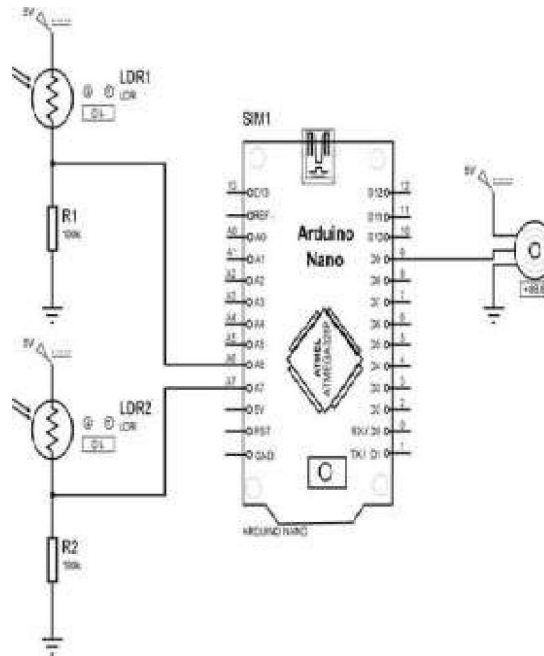
LDR -

LDR is a device whose sensitivity depends upon the intensity of light falling on it. When the strength of the light falling on LDR increases the LDR resistance decreases, while if the strength of the light falls on LDR is decreased resistance increased. In the time of darkness or when there is no light, the resistance of LDR is in the range of mega ohms, while in the presence of light or in brightness in decrease by few hundred ohms.

Arduino-

Arduino boards are widely used in robotics, embedded systems, and electronic projects where automation is an essential part of the system. These boards were introduced for the students and people who come with no technical background. Any kind of support and help is readily available by the Arduino community that is too easy to approach and sets you free from depending on others that may cost you bunch of dollars.

Circuit Diagram-



II. CONSTRUCTION

The Solar Tracker System is an auto tracking control system. Including of Solar Pane,LDR, Servo Motor, Resistor, Arduino NANO,PVC Pipe etc. The panel gets activated due to the higher strength of sunlight & convey it to the LDR sensor. The LDR sensor Output is conveyed to the Arduino. Then the Arduino compares it and generates a corresponding output to the servo motor. The motor rotates the panel to orient it toward the sun. A solar panel that is precisely perpendicular to the sun generates high power than the One that is not perpendicular.

III. WORKING

The working of Solar Tracker for tracking sun intensity, we connect the LDR Sensor with Arduino Nano programming. We connect the servo motor of the solar panel to the direction of sun intensity. We connect to2 LDR Sensors and give the command to increment and decrement in programming for adjusting the solar tracking.

CASE-1-Sunrise:

The sun rays direct to the solar panel. In this case the LDR Sensor.1 sense the light intensity. the light intensity is increase; resistance are decreases. The light intensity is inversely proportional to the resistance. The light intensity increases and output voltage is also increases; the light intensity is directly proportional to the voltage. The microcontroller only understands the voltage. The intensity of the light and voltage are equal. The Microcontroller doesn't not command to the motor and motor is not rotate.

CASE-2-Midday:

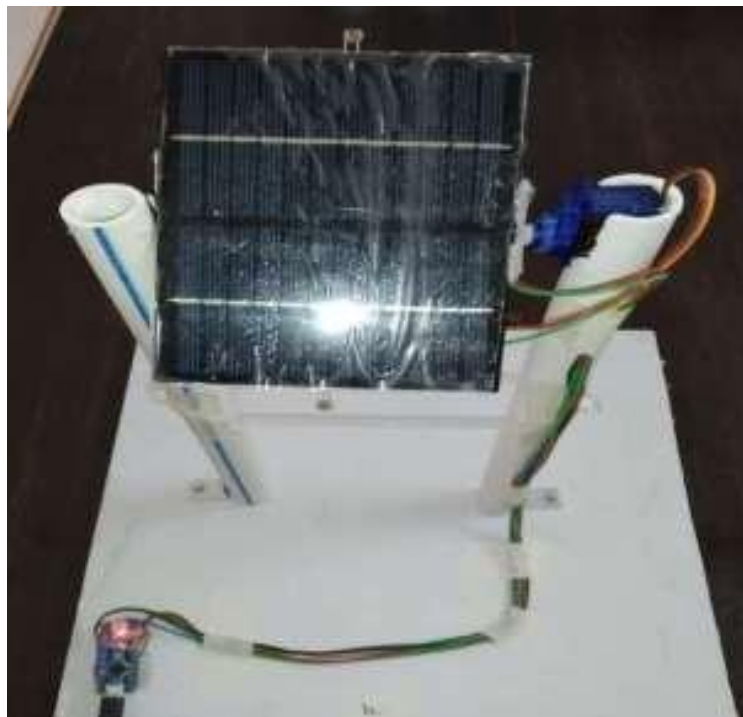
The sun is moved the solar can't collect maximum sun rays. The light intensity of LDR1 is less & LDR2 are as it is. In this case light intensity is decrease and resistance increases, and output voltage is also decreases. Then the microcontroller is detecting, the LDR1 light intensity is less & LDR2 is more. According to light intensity the microcontroller is command to rotate as long as voltage and intensity are equal. The servo motor rotates above 20degree. The maximum power collect at same solar plate.

CASE-3-Sunset:

The sun is moved forward about 90degree and solar can't collect sun rays. The light intensity of LDR1 is as it is but LDR 2 is less. In this case light intensity is decrease and resistance increases, and output voltage is also decreases.

Then the microcontroller is detecting, the LDR1 light intensity is less & LDR2 is more. According to light intensity the microcontroller is command to rotate as long as voltage and intensity are equal. The servo motor rotates above 90degree. The maximum energy collects the hole day.

Image of Project-



IV. RESULT AND CONCLUSION

Solar panels are stationary and do not follow the movement of the sun. Hence the maximum power is not generated during whole day. The maximum power is not generated form sun light when the solar plate is perpendicular to the sun. Hence other time the very few amounts of sun light is converted into voltage. By using this project, we can get the maximum power during whole day from the sun.

Sun tracking solar plate system that tracks the sun's movement according to the sun. It tries to maintain the solar panel perpendicular to the sun rays, ensuring that the maximum amount of sunlight is incident on the panel throughout the day. The sun tracking solar plate is a fully automatic hen no needs a manual switching.

The cost of this project is very low as compare to other sun trackers and solar plate also. The Maintenance of this project is also very low approximately nothing.

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