SOLAR ENERGY TRACKING SYSTEM USING ARDUINO AND SERVO MOTOR

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ABSTRACT

We believe that we need to use maximum energy get from sun and its are human rights too. Then we can offer this energy to needy people Solar energy is one of the most energy resources used widespread, to make solar energy more workable, the efficiency of solar array systems must be inflated. A feasible approach to inflate the efficiency of the solar array, systems are sun tracking. In this project, we will see a simple Sun Tracking Solar Panel circuit that will track the Sun and position the solar panels accordingly. In this work, an effort has been made to develop an electromechanical system programmed using a C++ programming language that controls the movement of a solar array so that it is constantly aligned towards the direction of the sun whereas the inflate energy of a solar panel can be produced by making the sun irradiation exactly perpendicular to the solar panel. The solar tracker designed and constructed in this work offers an authentic and cheap method of range a solar panel with the sun in order to inflate its energy output and its efficiency by 31% compared to the fixed solar panel.

Keyword: - Solar Tracker, Light Detecting Resistor (LDR), Arduino, Atmega 328, Servo Motor.

1. INTRODUCTION

The Nowadays, Solar energy is rapidly gaining popularity as a means of addressing energy sources. Hence, professionals must understand those who are familiar with this area better. Our project has the design and construction of a microcontroller-based solar panel tracking system. With rising growth and economic growth development, the problems of the energy crisis, and global warming effects can be heard today. A large amount of energy must also be available in the core of the sun. The energy that comes from the sun in an hour is more than what is consumed by us in a year. our project Solar Tracking system is a device that follows the movement of the sun as it rotates east to west every day. The solar tracking system starts following the sun from dawn, all day until evening, and starts again from dawn the next day. The solar tracker unit increases the amount of solar energy that is received by the solar energy collector and improves the energy output of the heat/electricity that is generated.

2. METHODOLOGY

WORKING OF SOLAR TRACKING

The In this project, the LDRs are working as light detectors. Before going into the details, we will need to understand how the LDR works. LDR (Light Dependent Resistor) also known as photoresistor is a light-sensitive device. Its resistance decreases when light falls on it which is why it is often used in the light or dark detector circuit. Check out the various circuits displayed on LDR here.

In building the solar tracking system, LDRs are used to determine the intensity of sunlight. The 2 LDRs are connected to pins A0 and A1 on the board. A servo motor is used for the rotation part. Usually, the servo has a yellow wire that is used to control the cycle and must be associated with pin 9 of the board. When light falls on the LDR, its resistance is different and a potential divider circuit is used to obtain the corresponding one voltage value from the resistance of

LDR.

The voltage signal is sent to the microcontroller. Built on a tension signal, a corresponding PWM signal is sent to the servo motor that rotates it and finally reaches a position where the intensity of the light falls on the solar panel is maximum.

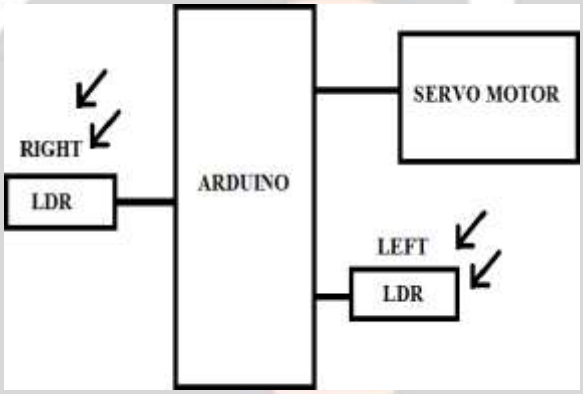
we will read the values from the LDRs and save them in R1 and R2. So we will make the difference between the two LDRs to move the servo accordingly. If the difference between them is zero it means that the same amount of light is falling on both LDRs, so the solar panel will not move. The use of this variable is that if the difference between the two LDRs is less than 5, the servo will not move. If we don't, the servo will continue to rotate.

Here's how you can build a simple solar panel tracker, which will automatically move towards the light like a sunflower. Here we used the low power solar panel to reduce the weight, if you are using high power or heavy solar panel, you need to choose the servo motor accordingly.

SYSTEM DESIGN

These projects include the design and construction of an Arduino-based solar tracker. This solar tracker system uses the Arduino board, a servomotor, 2 LDR, and 2 resistors to rotate the solar panel towards the sun or a source of light. In this project, LDR was selected since it has no polarity, and easy to interface with circuit, cheap, reliable, and is described by high spectral sensitivity, so that difference in high intensity is represented immediately by the change in its resistance value. The block diagram of the system as shown in figure 1

WORKING STEPS OF SOLAR TRACKER



First of all, take a small piece of cardboard and make a hole in one end. Later we will insert the screw to fix it with the servo. Now fix two small pieces of cardboard to each other in a V shape with the help of glue or a hot gun and place the solar panel on it. Then attach the underside of the V-shape to the other end of the small piece of cardboard you made a hole. Now insert the screw into the hole you made in the cardboard and insert it through the hole in the servo. The screw comes with the servo motor when you buy it. Now place the servo on another piece of cardboard. The size of the cardboard should be large enough so that you can place an Arduino Uno, a breadboard, and a battery on it. Attach the LDRs to the two sides of the solar panel with the help of glue. Make sure you have soldered the wires with the legs of the LDRs. You will need to connect them with resistors later. Now place the Arduino, the battery, and the breadboard on the cardboard and make the connection as described in the diagram.

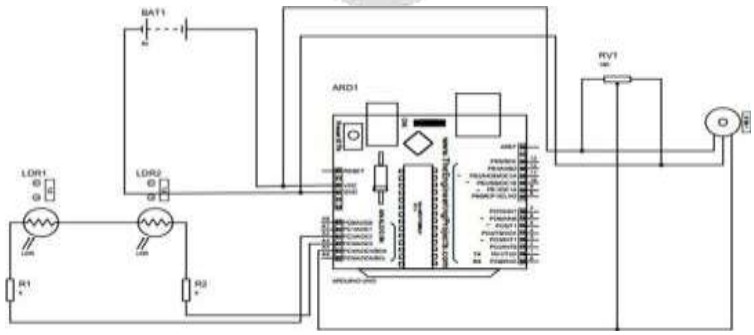
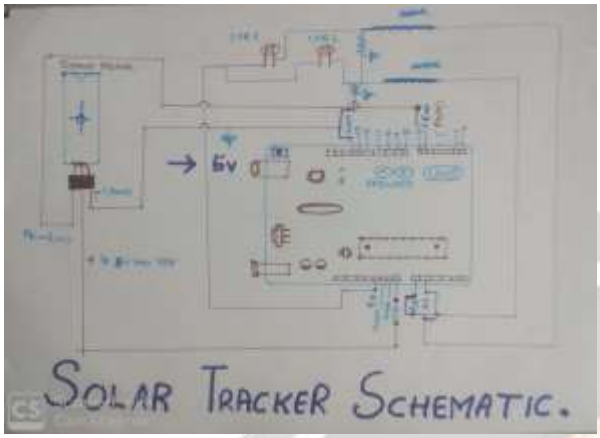


Fig -2: Schematic Diagram of Project

3. MODELING

Model and Material which are used is presented in this section. Table and model should be in prescribed format.



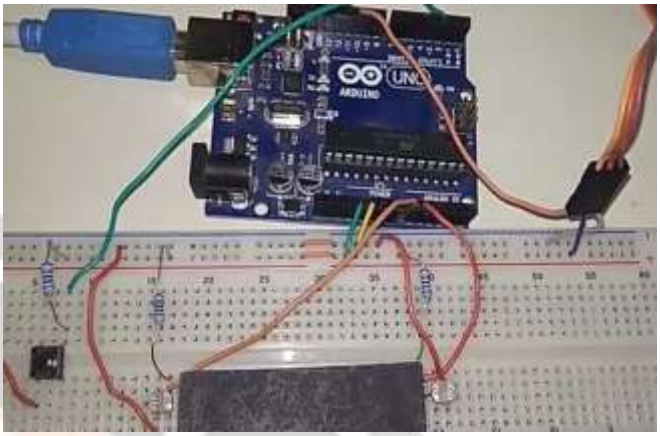


Table 1: Technnical Specification

Microcontroller	ATmega328
Input Voltage (limit)	6-20V
PWM Digital I/O Pins	6
Digital I/O Pins	14
Analog Input Pins	6
DC Current at 3.3V Pin	50 Ma
DC Current per I/O Pin	40 Ma
Operating Voltage	5V
Flash Memory	32 KB
EEPROM	1 KB
Clock Speed	16 MHz
Length	68.6 mm
Weight	25 g
Width	53.4 mm

4. RESULTS AND DISCUSSION

The result of this project is when light falls on the LDR, its resistance varies and a potential divider circuit is used to obtain the corresponding voltage value (5v) from the resistance of LDR. The voltage signal is sent to the Arduino microcontroller. Established on the voltage signal, a corresponding PWM signal is sent to the servo motor which causes it to rotate and to end with attains a position where the intensity of light falls on the solar panel is maximum..

5. CONCLUSIONS

A solar panel tracking system was designed and implemented. The solar panel tracking system aims to track the position of the sun and to capture as possible as energy for better efficiency of the solar panel has shown in the experimental results. This work can be executed for an industrial scale which is beneficial to develop countries like Nigeria and Sub-Sahara Africa countries. Our project help for future works is to consider the use of more sensitive and efficient sensors which consume less power and are also cost-effective. Because of this project we get more energy in cheap costs and we able to help needy people. The purpose of renewable energy from this solar tracking system offered a new and advanced idea to help to collect as possible as energy from sun and help needy people.

6. REFERENCES

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