"DUAL AXIS SOLAR TRACKING SYSTEM WITH MONITORING"

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Abstract - The capability of electrical phenomenon (PV) panel to come up with energy roughly follows the intensity of the daylight on the panel. A dual-axis star programmable logical controller primarily based automatic trailing system and its higher-up and system is meant and enforced during this project. The automated trailing system controls elevation and orientation angles of star panels such the panels perpetually maintain perpendicular to the day light. The measured variables of our automatic star trailing system are compared with those of a fixed-angle PV system. The results indicated that the automated star trailing system is low-priced, reliable and economical as are salts of the experiment, the electricity generated by the projected trailing system has an overall increase of concerning 8%~25% quite the fix-angle PV system Additionally to automatic trailing manual tracking also will incline to demonstrate the project at any time & its electrical parameters are noted all the way down those the result. Electrical parameters are measured victimization INA219 current device.

Key words: Solar Panel, INA219 Sensors, DC Geared Motor, PV array, buck converter, Arduino UNO.

1. INTRODUCTION

Solar power is that the quickest growing means that of renewable energy production with grid connected star capability increasing on the average by sixty percent annually from 2004 to 2009 consistent the National Center for Policy Analysis. Nonetheless alternative energy contributes to me solely the present scenario of the additional mature the section of alternative energy production, the electrical phenomenon (PV) electric cell technology, is one within which energy production is rising from Stanford protean. Reichstein, author of the new author paper. [1] The optics in targeted star applications settle for the direct element of daylight and so should be oriented suitably to gather energy. The prospects for cost-competitive star PV star PV power, believe the long run of PV star technologies look promising considering favourable location and continuing federal tax subsidies additionally as state renewable normal protocol. Among the advantages of this remotely articulated star hunter embody a most tilting angle of eighty degree with the horizontal axis to get rid of accumulated snow and sensitivity speed of from one extreme position to the opposite. [6]

2. OBJECTIVES

i) The main purpose of this to gift a bearing system which can cause higher alignment of electrical phenomenon (PV) array with sun light-weight and to reap alternative energy.

ii) The proposed system changes its direction in two axis to trace the coordinate of sunlight.
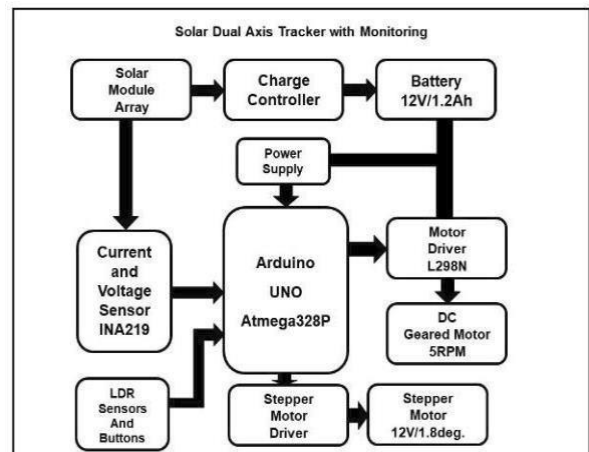
3. METHODOLOGY

3.1 BLOCK DIAGRAM

Fig. 3.1: Block Diagram Representation

Sensors perform necessary perform during this project LDR sensors are utilized in it. The most perform of LDR sensors is sense the sunshine and send the signal to microcontroller. This diagram showing that when the sensing light-weight send the signal to microcontroller. DC motor tracks the sun linearly subsequently stepper motor do it is own perform that is track the parabolic displacement of sun. twin axis hunter perform is justify with the assistance of this diagram as shown in figure one. The main purpose of this project is to gift which is able to cause higher alignment of PV array with sun light-weight and harvest alternative energy hunter system increase productivity by important margin.

4. EXPERIMENTAL SET-UP

The projected pursuit system will tracking of daylight a lot of effectively by providing PV panel rotation in 2 completely different axis. In dual-axis pursuit system optimum power is achieved by tracking the sun in four directions. During this method we are able to capture a lot of sun rays. Movement in 2 Mel axis is explained with the assistance of figure that is explaining basic plan behind twin axis pursuit.

Fig. 4.1 : Circuit diagram of the dual axis solar tracking system

4.1 CIRCUIT DIAGRAM EXPLANATION

a) Arduino UNO:

It is a heart of our project & an supply microcontroller supported the semiconductor unit ATmega338P microcontroller. Main perform of Arduino is that the offer input & offer management signal to the motor.

b) Motor operation by control pins:

Basically DC 2 motors are wont to rotating. The rating of this motor is 12v, 3 rpm. The six management pins are offer to the motor the pin one & pin six is speed control pins, it's operates sleek operation It's operated indirectly by Arduino so we are able to used motor driver to operation of the motor. the 2 pins are wont to management the motor operation. The M11, M12 pins is that the dextral (clockwise) operation and another operation M21, M22 pins is that the anticlockwise operation to be provided.

c) Voltage Divider

In electronics, a voltage divider is a passive linear circuit that produces an output voltage that is a fraction of its input voltage. Voltage division is the result of distributing the input voltage among the components of the divider. The three terms are variable in this formula, Vin R1 & R2.

A voltage divider used to the scale down a very high voltage so that it can be measured by a volt meter.
The formula of the voltage divider are as given below ;

$$\text{Formula} : V_{out} = V_{in} * R1/R1+R2$$

d) SENSOR

This is really a cool little device that not only allows you to measure current, but voltage as well. With a little multiplication, you can even measure power. In terms of voltage, you get to blow right past the Arduino 5V limitation. In fact, you can measure up to 26 Volts DC.

e) LDR

The all LDR are mounted. It's rotates at East west north south direction. Once the one LDR value is changes then the Arduino provides command to activated the direction of the motor. So that the motor is rotates clockwise or anticlockwise. The table no. 1 shown above the direction of the motor.
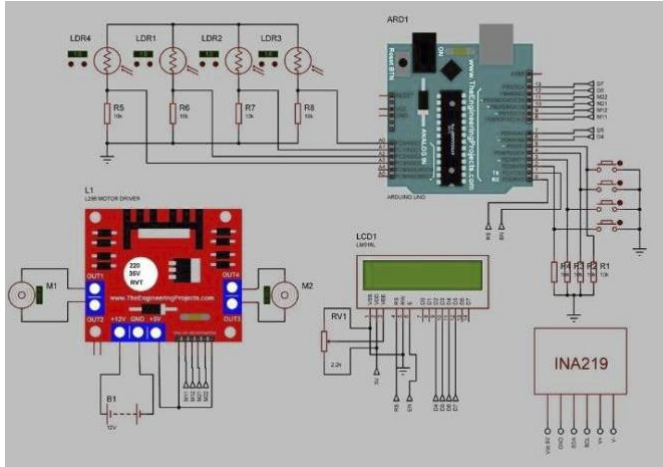
Input	Input	Pins	Rotation
0	0	M11	Stop
0	1	M12	Clockwise
1	0	M21	Anticlockwise
1	1	M22	Immediately stop

Table no. 1 : Direction of the motor
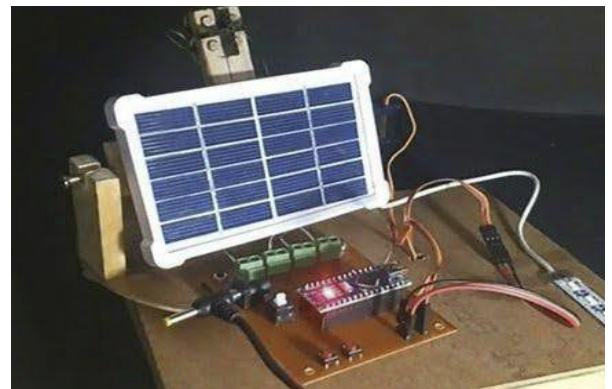
4.2 HARDWARE IMPLEMENTATION

Fig. 4.2: Hardware Design

The dual axis solar system is the automatic solar tracking system. In above topic we can study about the block diagram of dual axis of solar tracker. Now we study about the hardware implementation of dual axis solar tracker model. Final hardware shows in figure 4.2, details of components rating can be required for this project is shown in the Table no. 2

Name of Components	DIAGRAM	Specification	Function
Arduino Uno		Atmega328P	The Arduino UNO is an source microchip ATmega338P microcontroller & developed by Arduino's. [2,4]
Motor Driver		L298N/2A	Motor require high amount of current whereas the controller circuit works on low current signals.
Gears		25 Teeth	Gears used to amplify power.
DC Geared Motor		3.5 RPM	To move or rotate the final desired shaft at a desired slow RPM than motor.
Motor L Angle	------	Metal L angle	The operation is done by stepwise.
LCD Display		16*2	The light-modulating properties of liquid crystals combine with polarizers. [5]
Reimage Connector	------	16 Pin	-------
Potentiometer		100k/1w	Used to control electrical devices such as volume controls on audio equipment. [6]
Battery		12V/1.2Ah	It is used to security purposes & fire systems, emergency lightning system & UPS system.
Buck Converter		XL4015 Circuit	A buck converter is a DC-to-DC power converter which steps down voltage from its input to its output
PCB Large		180*150mm	It is the most imp properties of an epoxy & the temperature region
Current Sensor		INA219	This is really cool & little device, with a little multiplication, you can even measure power in terms of voltage.
LDR		3 mm	A photo resister is an active component that decreases resistance with respect to receiving luminosity on the components sensitive surface. [4]

Table no. 2 : Components ratings & Specifications

The model height is about two feet for good control of tracker elevation of panel is going to increased. Solar panel used for hardware implementation is 10wp/20 watt, that can be shown in above table. As we know stepper motor move in steps and it is best suited for accurate position control. A buck converter is also used in it, its specification is shown in table1, also Motor Angle, Current Sensor, PCB Large and Potentiometer are also used in it and its specification shown in table 2 and 12V battery is used.

5. 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 improvement. The experimental results clearly show that dual axis tracking is superior to single axis tracking and fixed module systems. Power Captured by dual axis solar tracker is high during the whole observation time period and it maximizes the conversion of solar irradiance Into electrical energy output.

6. FUTURE SCOPE

The debate on solar power production could be a debatable one concernedly regarding the potency, irresponsibleness and in particular the business practicability bearing on the investment value and grid parity of the system. Government subsidies have inspired within the development of PV scheme because the various to gas that is that the biggest contender in the production of electricity.

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