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Dual Axis Solar Tracking System for Getting Maximum Power Output

Rahul Wadate[1], Prof. Ayushi Kamble[2] , Yash Agrawal[3]

[1]Student, Department of Electrical Engineering, Siddhivinayak Technical Campus, Shegaon, Maharashtra, India

[2]Assistant Professor, Department of Electrical Engineering, Siddhivinayak Technical Campus, Shegaon, Maharashtra, India

[3]Student, Department of Electrical Engineering, Siddhivinayak Technical Campus Shegaon, Maharashtra, India

ABSTRACT

The main purpose of this paper is to present an impact system which can cause higher alignment of photo voltaic (PV) array with sun light-weight and to reap solar energy. The projected system changes its direction in 2 axis to trace the coordinate of daylight by police investigation the distinction between position of sun and panel. Hardware testing of the projected system is finished for checking the system ability to trace Associate in Nursing follow the daylight in an economical approach. dual axis solar tracking system superiority over single axis solar trailing system is additionally conferred.

Keywords : Photo Voltaic, Dual Axis Solar Tracking System, SOLAR TRACKER, Solar Energy, Relays, DC MOTOR, LCD Digital Display, L293D, DTL, MCU, PWM, SCADA

I. INTRODUCTION

Solar energy could be a terribly massive, inexhaustible supply of energy. the ability from the sun intercepted by the world is some (1.8*10^11) MW, that is several thousands of times larger than the current consumption rate on the world of all industrial energy sources. drawback related to the employment of alternative energy is that its accessibility varies wide with time. The variation in accessibility happens daily thanks to the day night cycle and additionally seasonally thanks to the earth's orbit round the sun. To rectify the issues the solar array ought to be such it continuously receives most intensity of sunshine. it's been seen since past that the potency of the electrical device is around 10-15% that isn't meeting the required load necessities. Thus there's a requirement of rising the panel potency through a cost-effective method. the prevailing pursuit systems supported sensing parts, stepper motors etc. have some disadvantages of their sorts. A simple solar pursuit system overcoming all the disadvantages of the models mentioned higher than is important so as to enhance the potency of the panel during a most economical method.

SOLAR TRACKER: Solar trailing system A star tracker is an automatic solar battery that truly follows the sun to induce most power. even if a hard and fast flat-panel is set to gather a high proportion of obtainable noon-time energy, significant power is additionally offered within the early mornings and late afternoons once the placement with a hard and fast panel becomes excessive to gather a reasonable proportion of the offered energy. as an example, even once the Sun is just 10° higher than the horizon the offered energy is around the noon-time energy levels (or even greater looking on latitude, season, and region conditions). Therefore the first advantage of a tracking system is to gather alternative energy for the longest amount of the day, and with the foremost correct alignment because the Sun's position shifts

with the seasons. kinds of trackers: star trackers are sorted underneath 2 basic categories: the one axis trackers and therefore the dual axis trackers. the one huntsman rotates east to west following the sun's movement, and therefore the twin trackers embody vertical and horizontal movements i.e. they'll incline or tilt to account for winter and summer sun angles. Single Axis Trackers are trackers with just one degree through that they rotate or use as axis of rotation. This axis is typically aligned following the North meridian. They rotate azimuthally from east to west following the path of a sun. Double or dual Axis tracker have 2 totally different degrees through that they use as axis of rotation. the dual axis are typically at a standard of every rotate each east to west (zenithally) and north to south (azimuthally).

COMPONENT: Microcontroller: It's the main a part of the system. The microcontroller controls all the operations. The electrical device is aligned in keeping with the intensity of daylight underneath the management of the microcontroller.

DC MOTOR: Interfacing a dc motor with a microcontroller, sometimes H-bridge is most well-liked method of interfacing a dc motor. currently several IC makers have H-bridge motor drivers out there within the market like L293D is most used H-Bridge driver IC. H-Bridge may also be created with the assistance of transistors and MOSFETS etc. rather of being cheap; they solely increase the dimensions of the look board, that thus me times is usually is typically not needed so employing a little sixteen pin IC is most well-liked for this purpose.

MOTOR DRIVER CIRCUIT: The L293D could be a monolithic integrated high voltage, high current four channel driver designed to just accept customary DTL or TTL logic levels and drive inductive masses (such as relays solenoids, DC and stepping motors) and shift power transistors. The speed of DC motor may also be controlled with MCU. PWM or pulse breadth modulation technique is employed to digitally management speed of dc motors.

RELAY: Relays are used wherever it's necessary {to management to regulate to manage} a circuit by a low power signal (with complete electrical isolation between control and controlled circuits), or wherever many circuits should be controlled by one signal. Here the relays are wont to dc motors.

Block Diagram (Figure 1) Here sun position can be calculated from sun position algorithm and panel position may be calculated from angle sensors connected to the tracker. Here the sun position and pv panel position each area unit given as inputs to the microcontroller which is able to rotate the panel to a definite position through the dc motor with facilitate of motor driver and relay. to induce actual following a logic is followed with the flow of signal with microcontrollers and IC's. The flow of signal is shown in below diagram. The microcontroller is interfaced to real clock and show LCD digital display alphanumeric display} display and to motor (Figures two and 3). The relays area unit wont to management the dc motors that area unit built-in in mechanism. The relay one is operated once ever the motor should run right-handed direction and equally relay two works when motor should

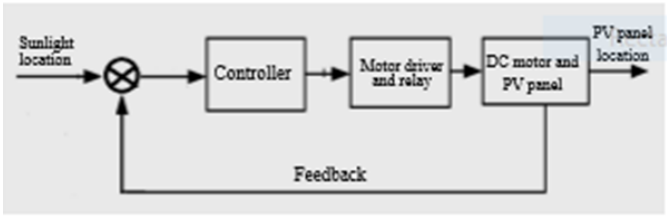

Figure 1. Block diagram of dual axis solar tracking system.

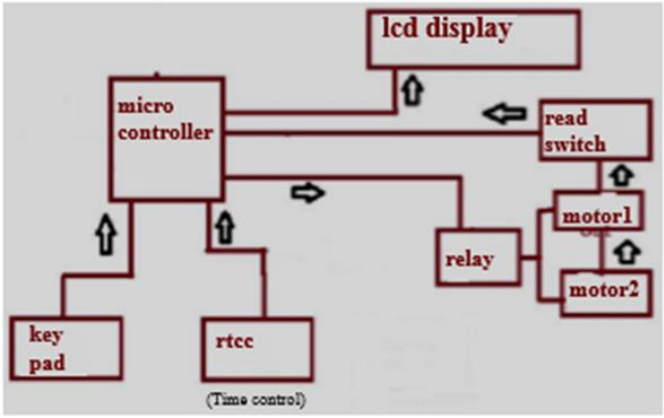

Figure 2. Block diagram of solar tracker control.

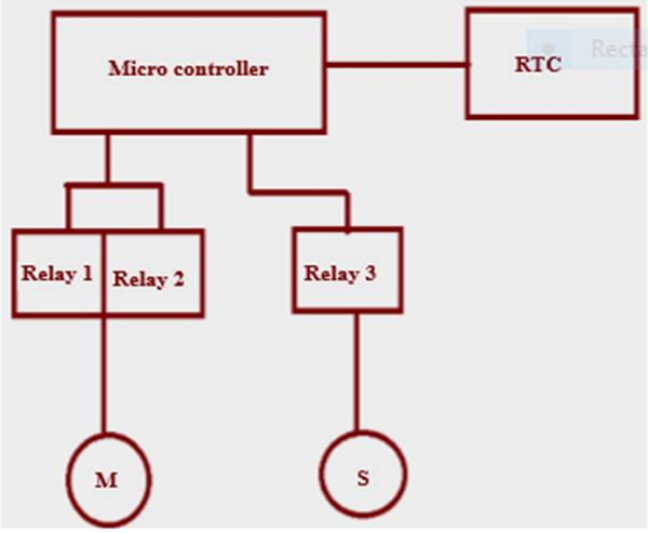

Figure 3. Motor control and its interfacing circuit.

run in anti-clockwise direction. A switch is additionally connected to the small controller with a sensing relay. Whenever the small controller gets off, it becomes tough to that to trace the position of panel, thus a switch is provided. when controller is ON, the panel can keep tilting till it touches the switch and once the switch is closed the controller senses that the panel is at zero position, currently it reads the time from RTC and sets the panel consistent with the time.

Experimental Result: The sun position that's azimuth and altitude position of sun ar shown in figure that is calculated from SPA (sun position algorithm) (Figures 5). Experiments results were performed by putting the designed system in exterior. Figures 1and 2 show the output power for PV systems

Time (24 hr)	Azim.	Alt.
06:00	80°	-1°
06:15	81°	3°
06:30	82°	6°
06:45	83°	10°
07:00	84°	13°
07:15	85°	17°
07:30	86°	20°
07:45	87°	24°
08:00	88°	28°
08:15	89°	31°

Figure 4. Azimuth and Altitude angle of sun.

(Single axis tracking and dual axis tracking). These observations were performed on the output power information is collected throughout 8:00 AM to 9:00 PM that are obtained through SCADA. (Figures 7 and 8) the power generated for single axis tracker is 128kw and for dual axis tracker is 157kw at 6.59am. The experimental results clearly show that dual axis tracking is superior to single axis tracking. Power captured by dual axis solar tracker is high throughout the total observation period [4-7].

II. CONCLUSION

A pre-determined star tracking system has been designed economically exploitation motorized linear mechanism. The planned overall solar tracking system design was tested, supported calculated knowledge of the altitude angle of Hyderabad. The obtained system response results show the simplicity, accuracy and pertinency of style in meeting completely different operational conditions.

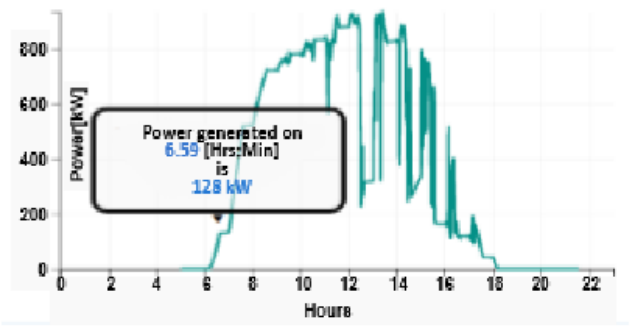

Figure 5. Output power of single axis solar tracker.

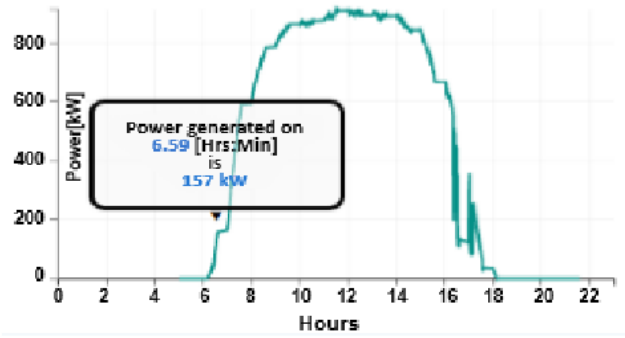

Figure 6. Output power of dual axis solar tracker.

III. REFERENCES

[1]. http://en.wikipedia.org/wiki/Solar_tracker

[2]. https://www.google.co.in

[3]. http://www.solar-tracking.com/

[4]. http://chargeursolaire.over-blog.com/article-the-working-principle-of-solartracking-controller-63106485.html

[5]. http://www.hindawi.com/journals/jre/2014/629717/

[6]. Barsoum N (2011) Fabrication of Dual-axis solar tracking controller projectIntelligent control and automation 2: 57-68

[7]. Mousazadeh H, Keyhani A, Arzhang J, Hossein M, Karen A (2009) A review of principle and sun-tracking methods for maximizing solar systems outputRenewable and Sustainable Energy Reviews 13: 1800-1818.