

Improving the Efficiency of Solar Panel by Continuous Energy Generation

Ramprabu J, Poovarasan V, Karunamoorthy B

Abstract--- Solar energy is taking part in a significant role in compensating the electricity as there's short fall during this energy because of a lot of demand and decline trends of typical source of energies exhaustion of fuels like coal, petroleum, natural gases associated constant of environmental and climatic changes to cope up this electrical phenomenon installation is being drained an electrical system to compensate and enhance the energy. Generation of electricity through renewable energy is drastically increasing day by day. The most commonly used renewable energy is solar energy. Energy can be only generate during day time, whenever sunlight is available. The problem is electricity cannot be generated during nighttime, when sunlight is not available. The proposed procedure utilizes incandescent lamp to create power from the sun oriented board amid evening time. The primary point of this undertaking is to control sunlight based board cover OPEN and CLOSE contingent on the sun light. To make it adaptable and a considerable measure of supportive for the parts more up to date patterns and advancements can encourage.

Keywords: Photo voltaic panel, halogen bulb, Maximum power point tracking

I. INTRODUCTION

Sun powered vitality is the light and brilliant warmth from the Sun that impacts Earth's atmosphere and climate and manages life. Elective vitality is commonly utilized as an equivalent word for sun powered vitality or a great deal of particularly to check with power produced from radiation. Since prior period, sun powered vitality has been controlled for human use through an assortment of advancements. Radiation close to optional sun based assets like breeze and wave power, power and biomass represent a large number of the accessible stream of sustainable power source on Earth.

Sun based boards introduced on your rooftop work best amid sunshine hours. At the point when the sun is sparkling straight forwardly onto them, daylight can be changed over into power. Your sun oriented board proficiency drops around evening time in light of the fact that there is no

daylight to change over to power and sun based boards can't produce control in haziness.

Dissemination misfortune diminishment is examined in [8]. In any case, Solar City has composed an answer for control your home in a moderate and ecologically benevolent route, even around evening time. Your sun based boards produce such a great amount of intensity amid a radiant day that any overabundance control you don't utilize instantly is saved and put into the utility network. The surplus power created by your sun oriented boards balances the vitality you use around evening time.

Daylight can be changed over into power utilizing photo voltaic (PV), concentrating sunlight based power (CSP), and different trial advances. PV has essentially been utilized to control little and medium-sized applications, from the adding machine controlled by a solitary sun based cell to off-lattice homes fueled by a photo voltaic cluster.

In most recent ten years, huge numbers of private around the globe utilized electric nearby planetary group as a sub control at their homes. This is on account of sunlight based vitality is a boundless vitality asset, set to wind up progressively critical in the more extended term, for giving power and warmth vitality to the client. Sunlight based vitality likewise can possibly be the real vitality supply later on. Sun oriented tracker is a computerized sun based board that really takes after the Sun to build the power [1] A large number of the sun oriented boards had been situated on a set surface like a rooftop. As sun is a moving article, this approach isn't the easiest procedure. One in everything about arrangements is to effectively track the sun utilizing a sun GPS beacon to move the sun based board to take after the Sun. With the Sun constantly confronting the board, the at most vitality is assimilated, as the board is working at their most prominent proficiency [2].

The primary goal for this task is to build up the sun following sun based board display that might be a gadget that take after the development of the Sun despite engine speed. Other than that, it's to upgrade the general power age utilizing double hub sun following framework and also to deliver the search for private utilize. LDR has been picked on the grounds that the sensor because of LDR is generally utilized in sun following framework. This can be because of LDR is touchy to the light. The opposition of LDR can diminish with expanding occurrence force level [3].

This progress creative of sun based battery charging venture is utilized for without fundamental power doing with progress imaginative strategy.

Manuscript published on 30 December 2018.

* Correspondence Author (s)

Ramprabu J, Assistant Professor II Department of Electrical and Electronics Engineering, Kumaraguru College of Technology, Coimbatore, Tamil Nadu, India

Poovarasan V, UG Student, Department of Electrical and Electronics Engineering, Kumaraguru College of Technology, Coimbatore, Tamil Nadu, India

Karunamoorthy B, Assistant Professor Department of Electrical and Electronics Engineering, Kumaraguru College of Technology, Coimbatore, Tamil Nadu, India

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](https://creativecommons.org/licenses/by-nc-nd/4.0/) article under the CC-BY-NC-ND license <https://creativecommons.org/licenses/by-nc-nd/4.0/>



Small scale controller is utilized to control the general unit in the project. LDR is outlined with divider circuit and associated with the controller. The controller screen the lighting source from the LDR and Activating force sparing mode task contingent on the yield of LDR circuit.

The Relay is utilized to switch battery sparing mode task. When LDR is gone low the controller switch the hand-off and control get from IR(infrared) to battery unit and furthermore

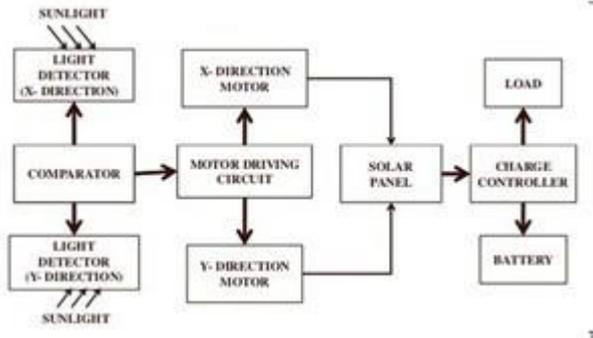


Fig. 1. Block Diagram

When LDR yields goes high power is naturally gotten from coordinate daylight.

In home machines reason have associated the dc to air conditioning converter board for light and other power sources. LCD (fluid gem display) is show the present procedures and furthermore we can see the which source from battery will charge.

The undertaking is made utilizing an adjusted felt that is 2 signals from the different sensors are thought about. Light Dependent resistor (LDR) as a light sensor has been utilized. The 2 light sensors are isolated by divider which can deliver shadow on one side of the daylight sensor if the sunlight based board isn't opposite to the sun. For the prevailing circuit, micro controller 16F877A goes about as a mind that controls the development of the engine by means of transfer. Data got from the sensors and handled by the micro controller (PIC16F877A). The micro controller can send a data to the Bi- directional DC-adapted engine by means of hand-off to ensure sun based board is opposite towards the Sun. Hand-off controls the revolution of the engine either to pivot clockwise bearing or anticlockwise course. The sun powered board associated with the engine are turned in advance as appeared in fig.1

II. PROTOTYPE OF AUTOMATIC SOLAR TRACKER

Improvement of sun powered board following framework has been advance for quite a while, in light of the fact that the sun moves over the sky for the duration of the day, it's beneficial to claim the sunlight based boards track the area of the sun, indicated the boards are constantly opposite with the situation of the sun. Offered sun powered trackers inside the market are much costly to coordinate with sunlight based board framework [4].

In the creating nations where fetched is one of the real issues to incorporate advancements, sun powered following model introduced at this paper can give a compelling

arrangement. The significant parts those are utilized as a part of the Proteus reenactment is appeared in Fig.2

1. LDR (light depending resistor)
2. Stepper motor
3. Arduino

A. Light Dependent Resistor

A Light Dependent Resistor (LDR) or a photograph resistor is a gadget whose resistivity is an element of the occurrence electromagnetic radiation

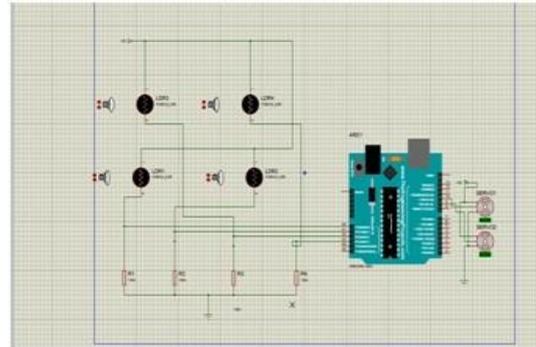


Fig. 2. Proteus Simulation

Thus, they are light delicate gadgets. They are likewise called as photograph conductors, photograph conductive cells or basically photocells. They are comprised of semiconductor materials having high opposition. There are a wide range of images used to demonstrate a LDR.

B. Arduino

Arduino is an open-source gadgets stage in light of simple to-utilize equipment and programming. Arduino sheets can read inputs light on a sensor, a finger on a catch, or a Twitter message and transform it into a yield actuating an engine, turning on a LED, distributing something on the web. You can guide your board by sending an arrangement of guidelines to the micro controller on the board. To do as such you utilize the Arduino programming dialect (in light of Wiring), and the Arduino Software (IDE), in view of Processing.

C. Stepper motor

Stepper engines are normally utilized as a part of exactness situating control applications. Five qualities of the stepper engine have been considered while picking stepper engine for the sun powered tracker model. Stepper engine is brush less, stack free, has open circle situating ability, great holding torque and magnificent reaction qualities. The stepper engine that has been utilized as a part of the model has the particulars of 24 volts, 130 Ω obstruction, 7.5° per stage, 4 stage, uni polar. Half venturing revolution is considered for the tracker to control position precisely with sun's turn which brings about 3.75° per stage.

III. THE SOLAR TRACKER WORKING

Solar tracker provides three ways of operation and control mechanism through the programme written in micro controller. Operational flow chart of the solar tracker follow three condition such as



A. Normal day light condition

Two photograph resistors are utilized as a part of the sun based tracker to look at the yield voltages from two intersections. As the sun turns from east to west in the day time, LDR1 and LDR2 needs to give higher voltage than LDR3 and LDR4 to detect the revolution of the sun. This condition is considered as would be expected light condition and tracker pivots the board 3.75° after each 15 minutes [5]

B. Bad weather condition

At the point when the sky gets shady, there will be less striking of light on both the photograph resistors thus adequate voltages won't be accessible at intersection point. The distinction of voltage at intersection point won't be more prominent than the edge an incentive to turn the tracker. At the interim, sun keeps pivoting in the western course. To take care of this issue, a short deferral is given which will check to voltage include from intersection point in like clockwork. Microcontroller will utilize the variable Count to check for successively 10 times to make the 'pause' state equivalent to 15 minutes (direct deferral) to pivot the stepper engine one stage.

C. Bidirectional rotation

At day time, the sun powered tracker will turn in just a single bearing from east to west. Variable I will include the aggregate turn day time and that is roughly ascertained as 40 revolutions thinking about 150° pivot. At the point when the sun sets, no more revolution is required western way. For the following day, the sun based board needs to go to the underlying position toward the beginning of the day to track the sun's position once more. To do as such, the variable I that include the quantity of revolution the day time will work out. At the point when the variable (I) demonstrates esteem more prominent than 40 [6] the tracker quits pivoting in the western bearing and turns conversely the eastern way to set the tracker to the board.

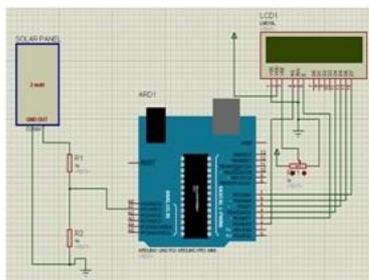


Fig. 3. Voltage Measurement

Voltage Measurement of the Solar Panel is simple which is up to 5 volts. Be that as it may, on the off chance that we need to gauge in excess of 5 volts then we need to utilize some extra hardware like Voltage Divider [7]. [8], [9], [10] This hardware changes as per Voltage, which implies How Much Voltage we need to Measure as appeared in Fig.3. charging time and how fastly the battery achieving the most extreme point is examined in [11], [8]. Give us a chance to assume on the off chance that we need to quantify 5 volts, at that point there is no requirement for any Additional Circuitry.

For estimating Voltage we need to take after the given Formula:

Voltage= (Analog value / resistor factor) * reference Voltage Where:

Analog value= Analog output of Voltage divider Resistor factor= $1023.1 / (R2 / (R2+R1))$

Voltage Reference = 5.2 volts

And let suppose: R1=1K= 1KR2

= $1023.1 * (1+1000)$ Resistor R-factor= $1023.0 * 0.5$

R-factor= 512 for up to 10 volts.

IV. EXPERIMENTAL RESULT AND IMPLEMENTATION FOR DAY AND NIGHT BATTERY CHARGER USING SOLAR PANEL

In this undertaking two LDR is settled on the sun based boards either side. LDR is only Light Dependent Resistor which shifts the obstruction relying upon the light fall. The differed opposition is changed over into voltage flag. At that point the voltage flag is given to ADC. ADC is only that believers simple to computerized signals which gets the two LDR voltage flag and changes over the info simple flag to relating advanced flag. The changed over computerized flag is given to microcontroller. Here the microcontroller is the blaze compose re programmable micro- controller got two advanced signs from the ADC and thinks about that flag [12]. This flag is fluctuated according to the daylight. The microcontroller shows the relating data on the LCD show and initiates the driver circuit for engine pivot. The engine is joined with the cover plate for open and close. The breaking point is determined by utilizing limit switches. The equipment setup is appeared in Fig.4.

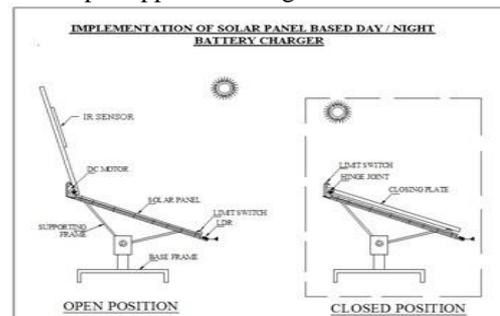


Fig. 4. Hardware Implementation

V. CONCLUSION

The paper has exhibited methods for following the sun's situation with the assistance of Arduino. Uncommonly, it shows a working programming answer for amplifying sun oriented cell yield by situating a sun powered board at the purpose of most extreme light force. The model speaks to a strategy for following the sun both in typical and awful climate condition. A typical sun powered plant stays sit still when daylight isn't great. Voltage source inverter is a key segment of both sun oriented plant, henceforth sunlight based plant is utilized as amid dim periods to enhance voltage control and power factor. Because of change in control factor stack current lessens. Additionally,



the framework stays adjusted with better proficiency and less transmission misfortunes. Reproduced dissemination framework's outcomes approve these focuses. Consequently, the power quality and electrical execution of the conveyance framework is moved forward.

The proposed framework was exhibited for taking care of the age booking issue considering day and evening time, the proposed technique to fathom the age planning to show the adequacy of this approach, an improved framework comprising day and night framework to deliver power. The outcome un- covered that the proposed day and night approach is extremely compelling is achieving an ideal age plan is considered

REFERENCES

1. M. A. Green, "Clean Electricity from Photo voltaics,," in Series on Photo conversion of Solar Energy, M. D. R. Hill, Ed., vol. 1. Imperial College Press, UK.
2. . M.A, Panait and T Tudorache, "A Simple Neural Network Solar Tracker for Optimizing Conversion Efficiency in Off-Grid Solar Gener- ator", 3 2008, vol.no.
3. Z. G. P. Piao, J. M. Kim, J. H. Cho, G. B. Baek, and H., "L, " A study on the tracking photovoltaic system by program type,," Intl. Conf. on Electrical Machines and Systems, vol. 2, pp. 971–973, 9 2005.
4. WATTSUNTM SOLAR TRACKER RETAIL PRICE AND DATASHEET.[Online].Available. [Online]. Available: <http://www.wattsun.com/prices.html>
5. H. Shaker, H. Zareipour, and D. Wood, "A data-driven approach for estimating the power generation of invisible solar sites,," IEEE Trans. Smart Grid, to be published.
6. Nourai, R. Sastry, and T. Walker, A vision & strategy for deployment of energy storage in electric utilities,, Minneapolis, MN, 7 2010.
7. K. A. A. A. W. Leedy, A constant voltage maximum power point tracking method for solar powered systems,, 2011.
8. "R.Sureshkumar, "Three phase load balancing and energy loss reduction in distribution network using labVIEW",," in International journal of pure and applied Mathematics, Volume No.116,No.11,2017,pp, pp. 181– 189.
9. R. E. A. Senturk, "Performance comparison of a double-axis sun tracking versus fixed pv system,," Solar Energy, vol. 86, no. 9, p. 2665, 2672.
10. "A review of time use models of residential electricity demand,," Renew. Sustain. Energy Rev, vol. 37, pp. 265– 272, 9 2014.
11. "J.RamPrabu, A.Poorani, B.RathnaSudheer,S.SuryaPrakash published a paper on "Implementation Of Fast Charging Unit"International," Journal of Informative & Futuristic Research ISSN (Online), vol. 2347, no. 1697, 2015.
12. Benda, X. Chu, S. Sun, T. Q. Quek, and A. Buckley, PV cellAngleop- timization for energy arrival-consumption matchinginsolarenergyharvestingcellularnetwork,,2017.
13. P. Keerthana, B.G. Geetha, 3 P. Kanmani," Crustose Using Shape Features And Color Histogram With KnearestNeighbour Classifiers", International Journal Of Innovations In Scientific And Engineering Research, Vol. 4, Iss. 9,2017,Pp. 199-203.
14. K.Malarvizhi, R.Kiruba," A Novel Method Of Supervision And Control Of First Order Level Process Using Internet Of Things", Journal Of Advanced Research In Dynamical And Control Systems, Vol. 9, Sp– 6, 2017, Pp. 1876-1894.
15. Latha.L, Suriya.P And Sindhuja.V.P," Automating The Irrigation System", International Journal Of Pure And Applied Mathematics, Vol.116, No. 11,2017, Pp. 211-219.