Journal of Advanced Research in Alternative Energy, Environment and Ecology
Volume 7, Issue 4 - 2020, Pg. No. 21-25
Peer Reviewed Journal

Review Article

Efficient Solar Tracking System for Optimum Power Output: A Review

Yawer Yousuf[1], Kiranpreet Kaur[2]

[1]M.Tech Scholar, [2]Assistant Professor, Department of Electrical Engineering, Desh Bhagat University, Punjab, India.

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Corresponding Author:
Yawer Yousuf, Department of Electrical Engineering, Desh Bhagat University, Punjab, India.
E-mail Id:
yaweryousuf317.yy@gmail.com
Orcid Id:
https://orcid.org/0000-0002-0570-7406
How to cite this article:
Yousuf Y, Kaur K. Efficient Solar Tracking System for Optimum Power Output: A Review. *J Adv Res Alt Energ Env Eco* 2020; 7(4): 21-25.

Date of Submission: 2020-10-30
Date of Acceptance: 2020-11-20

A B S T R A C T

Power plants based on the solar concept are very important for areas facing electricity shortage. To address the electricity shortage it is very essential to deploy latest and emerging technologies like IoT to transfer the world into smart concepts like intelligent vehicles, power plants with smart machinery etc. The paper presents the review of smart and efficient solar tracking system with manual and automatic rotation of panels based on the intensity of lights.

Keywords: Internet of Things (IoT), Photovoltaic (PV), Liquid-Crystal Display (LCD), Light-Dependent Resistor (LDR), Light-Emitting Diode (LED)

Introduction

Solar energy is the energy extracted from the rays of the sun within the style of heat and electricity solar energy is one amongst the most sources of electricity utilized in our day to day life those who board some secluded areas don't have the correct access to the electricity attributable to the govt. negligence moreover as of the price conjointly it's become price big-ticket and could be a necessary issue of pollution, once it involves victimisation fossil fuels, therefore there must be another to contend with this type of limitation. Hence, in such cases, alternative energy becomes the simplest possibility for the folks living their alternative energy, on the contrary, is clean, silent and reliable with low maintenance and most importantly, its eco-friendly alternative energy resolves the shortage of electricity to a great extent and covers most of the customer's happiness to backward class. PV stands for electrical phenomenon and it merely means that the conversion of sunshine into electricity victimisation conductive materials that contain the photovoltaic impact i.e. creation of electrical currents during a material once exposed to lightweight. Remote watching at the solar energy plants, maintaining the health of the star PV system is of preponderant importance, and continuous watching is needed. Most of the star PV plants are put in remote locations and controlled by modern techniques.

Literature Review

Chowdhury et al. (2019) presented in their paper entitled "A Low-value Closed-Loop star chase System supported the Sun Position Algorithm" describes Sun position and also the optimum inclination of a solar battery to the sun vary overtime throughout the day a straightforward however correct star position activity system is important for maximizing the output power from a solar battery to extend the panel potency whereas minimizing the system value star position may be measured either by a device (active/ passive) or through the sun position observance formula. Sensor-based sun position measurement systems fail to live the star position during a cloudy or intermittent day, and that they need precise installation and periodic calibrations. In distinction, the sun position algorithms use mathematical formula or astronomical information to get

the station of the sun at a specific geographical location and time. A standalone affordable however high-precision dual-axis closed-loop sun-tracking system exploitation the sun position formula was enforced in associate 8-bit microcontroller platform. The Astronomical Almanac's (AA) formula was used for its simplicity, dependableness, and quick computation capability of the star position. Results unconcealed that incorporation of the sun position formula into a star chase system helps in outperforming the mounting system and optical tracking system by 13.9% and 2.1%, severally. In summary, even for a small-scale star chase system, the algorithm-based closed-loop dual-axis chase system will increase overall system potency.

Jumaat & Othman (2018) revealed in their study entitled "Solar Energy activity exploitation Arduino" describes that this project aims to develop a measurement of alternative energy using Arduino Board technology during this analysis, four parameters that been measured are temperature, intensity level, voltage and current. The temperature was measured exploitation temperature device the sunshine intensity was measured exploitation Light-Dependent electrical device (LDR) device. The voltage was measured exploitation the potential divider as a result of the voltage generated by the solar battery are giant for the Arduino as receiver finally for this was measured exploitation the current device module which will sense the current generated by the solar battery. These parameters because the input worth for the Arduino and also the output was shown at the liquid show (LCD) screen. The liquid crystal display screen display output of the temperature, the sunshine intensity, the voltage and also the current worth the aim of Arduino to convert the analog input of parameter to the digital output and show via liquid crystal display screen aside from that, this project additionally involve with a style to confirm that device case is straightforward to carry around.

Aigboviosa et al (2018) in their the research paper entitled "Arduino Based Solar Tracking System for Energy Improvement of PV Solar Panel" defined alternative energy could be a clean, simply accessible and copiously accessible energy supply in nature obtaining alternative energy from nature is extremely useful for power generation employing a mounted electrical phenomenon panels extract most energy solely throughout twelve times of day to 2 PM in an African country which ends up in less energy potency. Therefore, the requirement to enhance the energy potency of PV solar battery through building a star chase system can't be over-emphasized electrical phenomenon panels should be perpendicular with the sun to urge most energy. The methodology used during this work includes the implementation of associate Arduino based mostly star chase system Lightweight Dependent Resistors (LDRs) are wont to sense the intensity of daylight and therefore the PV solar battery is adjusted consequently to trace most energy. The mechanism uses a servo motor to regulate the movement of the solar battery. The microcontroller is employed to regulate the servo motor supported signals received from the LDRs. The results of this work have clearly shown that the chase solar battery produces additional energy compared to a set panel.

Akhter and Nayeem (2018) in their study entitled "Automated Solar Panel with Web Monitoring" described the machine-driven solar panel turn out additional electricity rather than the existing system. The goal of this paper is to style an associate automatic sun lightweight chase system, which may find the position of the sun. The chase system can move the solar battery so that it's positioned perpendicular to the sun for max energy conversion in the least time. Our system can turn out up to twenty-fifth additional energy than that star panels are while not chase module show battery charge proportion and advise the U.S. whereas charging. The main target of this paper is to attach system with an electronic computer which will manage and monitor the energy manufacturing level via native or live server. The system will update the energy manufacturing level by itself mechanically when an interval and additionally show it on the net apps native or live server daily system information can store into information.

In his paper entitled "Design of most electric receptacle chase for star Controller Drying System: associate Experimental Study" M. Jalil et al (2018) described the performance of maximum power point tracking as a solar furnace of PV system integration for agriculture product drying system. The system includes of the solar furnace, chase PV array, the battery bank, the small controller and also the DC convertor this method is a style to boost the work of solar furnace in drying method. This style is hoped to be an associate acceptable system to confirm the most result by providing radiation energy. This paper shows the experiment information of the voltage and power response in positioning the PV to yield a most electrical phenomenon array output power of star drying system device.

Subhasri. G and Jeyalakshmi. C (2018) analysed in their study entitled "A Study of IoT based mostly solar battery chase System" has given the IoT framework to the solar panel tracking systems the total paper is the study of the star chase systems supported the IoT and it's been complete that it may be manipulated anyplace like in households or at workplace.

Mustafa et al (2018) revealed in their paper entitled "Simple style and Implementation of star chase System 2 Axis with Four Sensors for Baghdad city" the most goal of skyrocketing the potency is to urge the most power from the solar battery. The project is to style and implementation straightforward and low-cost value star huntsman system

with 2 axes (azimuth angle likewise as altitude angle) exploitation lightweight Dependent electrical device (LDR) with real dimensions the project composed of solar battery, two-motor satellite dish and ball-joint, LDR device module associated an electronic circuit. This project is compared with mounted solar battery and also the results showed that star huntsman additional output power than a fixed solar panel. The project is split into 2 parts; hardware and electronic. Hardware half usually composed of solar battery, two-DC motors with case and LDR device module. The second half is electronic circuit during this work sensing of the sun position administrated in 2 stages, 1st stage or direct sensing performed via a set of LDR sensors as output standardization to trims the angle and altitude angles. The second stage, once the weather is cloudy, dirty or rain, the chase system can stop that the system keeps within the position of the sun while not move however consistent with Kelly circular function relation the facility will decrease according to the Republic of Iraq - Baghdad town weather as a result of we've regarding 10-15 rainy days that each day has (2-4) hours have cloudy and rain. The energy extracted from electrical phenomenon (PV) or any solar furnace depends on star irradiance. for max extraction of energy from the sun, the solar furnace panel must always be traditional to the incident radiation star trackers moves the solar collector to follow the sun path associated keeps the orientation of the solar collector at the best angle star chase system improves considerably the energy potency of electrical phenomenon (PV) panel during this paper, associate automatic twin axis star chase system is meant and developed exploitation lightweight Dependent electrical device (LDR) and DC motors on a mechanical structure with gear arrangement. The results indicated that the automated star chase system is additionally reliable and economical than mounted one.

Jain et al (2017) described in their paper entitled "Solar Home Lighting System with AC and DC loads" that the objective of the study is to produce alternate lightning system by exploitation alternative energy. The system taken for the study consists of a solar battery of 10W, a 12 V battery, a star charge controller, Multivibrator IC (CD 4047), MOSFET (IRF Z44N), Step down transformer (12-0-12). It provides resolution to the gap between energy demand and energy handiness. The charge controller maintains the flow of charge to the battery i.e., it protects the overcharging and deep discharging of the battery. At an equivalent time, PV technology is that the strongest growing electricity generation technology that additionally provides an answer to the world warming nearly every portion of tropical India is favourable for adopting this technology. PV energy is being employed across the planet with totally different conversion technologies as autonomous power packs and as grid-integrated systems style of convertor and cargo depends on the applying to that it is meant. The study presents the analysis of star battery-powered home lighting system much and verifies the look of the system for reliable and best performance.

Kumar B et al (2017) the analysis article entitled "Dual-Axis star Tracker" have incontestable Non-renewable energy sources like fossil fuels are before long being depleted and in close to future we'll be sweet-faced with its extinction energy sources that are renewable and are accessible in lush amount are needed. Sun's insulation fits each the standards therefore there are rising technologies cantered on gathering alternative energy. Be it electrical phenomenon panels or concentrating panels, they are not most effective if they are put in during a mounted position because of earth's spin we tend to see the sun in several positions throughout the day, therefore lightweight huntsman is employed together with mechanisms that orient a solar battery or a concentrating panel throughout the day planning and fabricating a twin axis star huntsman one must have a correct grasp of Basic physics, management systems and mechanical mechanisms.

Racharla and Rajan (2016) analysed in their paper entitled "Solar Chase System—A Review" that the facility from the reduction of fossil fuels is that the biggest challenge for subsequent 0.5 century the concept of changing alternative energy into electricity exploitation electrical phenomenon panels holds its place within the front row compared to different renewable sources however the continual modification within the relative angle of the sun to the world reduces the watts delivered by the solar battery during this context star chase system is that the best different to extend the potency of the electrical phenomenon panel star trackers move the payload towards the sun throughout the day during this paper differing types of chase systems are reviewed and their professionals and cons are mentioned very well. The results given during this review ensure that the angle and altitude twin axis chase system is additional economical compared to different tracking systems but in value and adaptability purpose of reading single-axis chase system is additional possible than twin axis tracking system.

Proposed System

The paper presents the modern solar tracking system for optimum power output. In this system, the LDR sensors are used to detect light from the environment. This system has two modes, manual mode and automatic mode. In manual mode, when the user changes the values of tow potentiometers the position of servo motors will also change depends on the input given by the user using the potentiometer. In automatic mode, the LDR in which drop or fall of resistance is more upon the increase in the intensity of light, the servomotor will change its angle to the position where it obtains max voltage and hence solar panel during

day time when there is fall in resistance on any of the LDR the street lights will turn off and during night time when there is no fall in resistance on LDR's the lights (LED) are turned On. LCD is used in this system to display the status of the project at each step.

The different components used in this system are:

- LDR Sensor
- Servomotor
- Potentiometer
- LED
- Solar Panel
- LCD

Comparative Analysis of Literature Review

Reference	Title	Technique	Research Findings
Chowdhury et al	A Low value Closed-Loop star chase System supported the Sun Position Algorithm	Optimum inclination of solar battery	Describes the Sun position and also the optimum inclination of a solar battery to the sun vary over time throughout the day Energy Resources) to develop an independent electric infrastructure
Jumaat and Othman	Solar Energy activity exploitation Arduino	Arduino	Describes to develop a measurement of alternative energy using Arduino Board technology
Aigboviosa et al	Arduino Based Solar Tracking System for Energy Improvement of PV Solar Panel	Arduino	Defines alternative energy could be a clean, simply accessible and copiously accessible energy supply in nature
Akhter and Nayeem	Automated Solar Panel with Web Monitoring	Machine Driven Solar Panel	Describes the machine-driven solar panel turn out additional electricity rather than existing system
M Jalil et al	Design of most electric receptacle chase for star Controller Drying System: associate Experimental Study	PV	Describes the performance of maximum power point tracking as a solar furnace of PV system integration for agriculture product drying system

Conclusion

The paper presents the fundamentals of solar technology and the need for remote monitoring using the latest techniques. In simple words, the paper presents a review of the efficient solar tracking system for optimum power output.

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