

An Abstractive Review on Automatic Solar Tracking System

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Abstract: The solar energy is a clean, uninhibitedly and liberally accessible elective energy source in nature. Catching solar energy from nature is a profitable undertaking for control age. Change of sun energy into another frame is an exceptionally complex marvel. For this reason, Photo-Voltaic (PV) panels are utilized which change over Sun energy to Direct Current (DC) electrical energy. Ordinary settled write PV panels extricate most extreme energy just amid 12 twelve to 2 PM which brings about less proficiency. In this way, working of an automatic solar tracking system is the need of 60 minutes. PV panels must be opposite with the sun for most extreme energy extraction which can be satisfied via automatic tracking. Automatic Solar Radiation Tracker is a system that controls the development of a solar exhibit with the goal that it is always adjusted towards the heading of the sun. Different innovations are being utilized worldwide for the achievement of such systems. This paper surveys some of these innovations.

Keyword: LDR, DC Gear Motor, PLC, Magnetic Reed Switch, Solar Panel.

I. INTRODUCTION

Today every nation fulfils its energy needs from an assortment of sources that could be sorted as business and non-business. In the previous couple of years, it is noticed that petroleum derivative assets are quick draining and that the non-renewable energy source period is step by step reaching an end especially for oil and gaseous petrol. The most difficult issue of utilizing regular energy sources is its unsafe consequences for the earth. It is additionally the fundamental supporter of the unnatural weather change wonder which is currently a matter of incredible concern. As indicated by most recent report of the Intergovernmental Panel on Climate Change (IPCC), the worldwide normal temperature has expanded in light of increment in the grouping of methane and nitrous oxide. In this manner, to defeat these difficulties the sun energy must be utilized all the more every now and again. Solar energy is spotless and sustainable wellspring of energy which is richly accessible in nature. The sun is a vast circle of extremely hot gases, the warmth being produced by different sorts of combination responses. Breadth of the sun is 1.39×10^6 Km and measurement of the Earth is 1.27×10^4 Km. The mean separation between them is 1.496×10^8 Km. In spite of the fact that the sun is substantial, it subtends a point of 32 minutes (0.53°) at the world's surface as a result of having huge separation. Therefore, the bar radiation got from the sun on the earth is relatively parallel. The brilliance of the sun shifts from its inside to its edge. The power got by the earth from the sun is around 1.8×10^{11} MW which is a large number of times bigger than the present utilization rate on the earth of all business energy sources. In this way, with the assistance of solar energy a huge number of years could be lived without being needy upon ordinary energy sources, for example, fossil fuels.[12] India has 3000-4000 daylight hours for each year which can produce an electrical energy which will be several times more prominent than the present utilization of energy by the nation. For proficient energy extraction/age from the sun energy the PV panels must be kept opposite to the bearing of the sun development for the duration of the day. In this manner, the intention behind this task is to outline an automatic solar tracking system which could extricate most extreme measure of sun energy and change over it to electrical energy.[12] The non-inexhaustible sources take a huge number of years to be framed in the outside layer of the earth by normal procedures. When consumed to create power, they are gone until the end of time. Consuming non-renewable energy sources make undesirable side-effects that dirty our condition which changes the planet's atmosphere and damages ecosystems. Then again with 0% contaminating specialists, solar power is boundless.

The situation of the sun in the sky differs as per the season of day as the sun moves over the sky. Any solar controlled hardware works best when it is pointed at or close to the sun. In this way, clearly a hardware which is fuelled by a stationary solar panel gives a less productive yield. Late advancements in solar energy center on boosting system productivity. A few techniques for solar tracking systems have been concentrated to keep the solar panel adjusted to the daylight. A perfect tracker would enable the solar panel to point precisely towards the sun.

There are two wide sorts of solar trackers:

- Single Axis

The single hub trackers can either have a level or a vertical pivot. The flat kind is utilized as a part of tropical areas where the sun gets high at twelve, yet the days are short. The vertical kind is utilized as a part of high scopes where the sun does not get high, but rather summer days can be long.

- Dual Axis

The double pivot trackers have both an even and a vertical hub and in this manner they have an extensive variety of tracking, which makes them usable in corner of the world. Double hub tracking is critical in solar pinnacle applications.

In this manner, the issue proclamation of this thesis is to control photovoltaic (PV) panel development because of the daylight utilizing Light Dependent Resistors, microcontroller, DC motors to extricate greatest measure of sun energy and change over it to electrical energy and get every last information by utilizing ZigBee transmitter and collector and display and store the same on PC Section 2 of this paper is writing audit, which uncovers the investigation of existing work in the solar tracking field and furthermore gives the current outlines of the same. Writing survey additionally uncovers distinctive tracking components which can be utilized to constantly track the sun.

II. LITERATURE REVIEW

This literature survey uncovers the itemized work that has been done till date on the point of Solar Tracking. N. Othman, M. I. A. Manan, Z. Othman, S. A. M. AlJunid have outlined a two-pivot sun tracking system with the utilization of five LDRs and an Arduino UNO controller [1]. The goal of this exploration is to outline and build the automatic double hub solar tracker for greatest sun energy use. The main purpose of stress is that this system ought to devour energy as least as conceivable so the contrast between controls change and power utilization would increment and thus the net benefit of the system. Arduino UNO controller has been utilized and it is modified in C dialect. LDRs are utilized to identify the most extreme daylight position in the sky and the program composed performs computations and drives the servo motors to make PV panels opposite to the sun [1]. The sun makes a trip from east to west as well as there is a difference in edge in north to south bearing too. So the north and south bearings ought to likewise be dealt with. Double pivot trackers do that. These trackers track the sun on an even and in addition vertical pivot. Due to this working capacity the double pivot trackers have more yield control than the single hub trackers. Light Dependent Resistors are utilized to locate the brightest spot of the sun in the sky. LDRs are associated with Arduino UNO controller which becomes more acquainted with the situation of the sun in the sky and subsequently turns the motors towards the sun. Two Servo motors are utilized for panel turn which likewise satisfies the ease and lightweight criteria [1]. Md. Tanvir Arafat Khan, S.M. ShahrearTanzil (2010) have composed and developed a microcontroller based solar tracking system utilizing LDRs to detect the intensity of daylight and stepper motors to move the Photo-Voltaic (PV) panels as per the sun [2].

Fabian Pineda, and Carlos Andres Arredondo (2011) have composed and executed a two-pivot sun module situating by detecting the most extreme splendor point in the sky. A geodesic vault based sensor has been worked for the splendid point tracking [3]. Authors Salabila Ahmad et al. have planned and built an open circle two tomahawks sun tracking system with a point controller. The equipment is chosen, for example, it will boost the power gathered and limit the power expended as the proficiency parameter lies in the middle of these two power parameters [4]. Solar tracking likewise causes in transmitting daylight to dull territory like storm cellar. Creators Jifeng Song et al. have executed the high exactness tracking system in light of a mixture technique for concentrated daylight transmission through strands [5]. Creator CemilSungur (2008) has displayed the multi-tomahawks sun tracking system with PLC control. The azimuth and elevation points of the sun are figured for a time of 1 year at 37.6° scope where Turkey is found.

As indicated by these edges, an electromechanical system which tracks the sun as per azimuth and height point is composed and executed [6]. Creators A.chaib et al (2013) have displayed the heliostat introduction system in light of PLC robot controller. It is displayed that by mounting certain no. of heliostats and confronting them towards focal power tower water can be warmed and turbines can be driven for energy transformation reason. By applying MATLAB program for deciding the sun's situation for heliostat introduction and by utilizing PLC robot controller it is displayed that most extreme measure of energy gets changed over from solar to power. Concentrated Solar Power (CSP) is utilized as a part of this examination [7].

Creators Tao Yu and Guo Wencheng (2010) have presented automatic sun-tracking control system in light of Concentrated Photo Voltaic (CPV) age. CPV age works viably when light panels follow the sun precisely. Stepper tracking control innovation is utilized. This control depends on control circuit with ARM and camera which can give capable computational ability [8].

III. DESIGN OF A TRACKING SYSTEM

In this investigation, a microcontroller (AT89C52) based Automatic Solar Tracking System is actualized. 4 LDRs are utilized to detect the power of the daylight. LDR has the property of diminishing its protection as the light falling on it increments. Remembering this standard a microcontroller program is composed for tracking reason. LDRs are associated with Analog to Digital Converter (ADC) in light of the fact that the Microcontroller comprehends the advanced dialect and the yield of LDR is a simple amount. Three outfitted DC motors are utilized to move the solar panels. Out of them two are of 30 Revolutions for each Minute (RPM) speed and one is of 10 RPM speed. A temperature sensor LM 35 is additionally used to monitor PV panel yield execution with change in temperature. A remote convention ZigBee (XBee) is likewise executed to exchange the information from the genuine place of equipment mounted

(plant) to (PC/regulating region). Zigbee (XBee) has leeway of low power utilization and furthermore has scope of 10 to 100 meters. In light of the writing audit and current situation of solar tracking, it was chosen to construct an Automatic Solar Tracking System as appeared in Figure1. In this system, 4 LDRs and one temperature sensor are associated with ADC. Four LDRs are mounted on PV panel. In figure 1, the numbered 1, 2, 3, 4 are the four LDRs. The plan and depiction of the system is with the end goal that the PV panel moves towards the course of LDR which has a least protection contrasted with the other three. Power supply is given to ADC, Microcontroller and DC motors.

Three DC motors are associated with the microcontroller and after that to the PV panel. XBee transmitter gets signals from microcontroller and transmits those signs to the XBee beneficiary side at the PC end. These signs are each LDR's protection esteem, PV panel Output voltage, present and surrounding temperature. The transmitted flags by XBee will be gotten by XBee recipient module and will be displayed on and put away in PC. A solitary 16*2 Liquid Crystal Display is additionally used to display the previously mentioned parameters.

IV. CONCLUSION

A 89S52 microcontroller based Automatic Solar Tracking System has been actualized utilizing outfitted DC motors and LCD. From Experimental outcomes it can be inferred that the solar tracking system is more useful in all faculties than the settled panel system. Diverse arrangement of readings on various natural conditions have been taken for experimentation. From the readings the paper is examined and thus finished up.

- On a run of the mill clear and bright day, settled panel has most extreme yield just amid 11:00 AM to 3:00 PM. Automatic tracking system panel is 60% effective at 7:00 AM, 95% productive at 12 twelve, and 83.7% proficient at 5:00 PM.
- The normal energy of the automatic solar tracking system leads ahead by 17.45% to that of settled panel on a regular clear and bright day.
- In a mostly overcast day, settled panel has greatest yield just amid 11:00 AM to 2:00 PM.
- Most extreme power yield of the settled panel is just 62.7% of the appraised control yield. Double pivot panel is 66% proficient at 9:00 AM, 68% productive at 12 twelve, and 60% effective at 5:00 PM.
- On a shady and cloudy day, All LDRs oppose in blended conduct because of uneven light force on this specific day. The normal power created by the settled panel is 2.170 W though automatic solar tracking system produces 3.096 W. Settled and automatic tracking have less power yield than alternate days.
- From the above determinations a last conclusion could be made that in any natural condition the automatic solar tracking system is a way much preferred usage over the settled panel.

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