



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

SUN TRACKING SOLAR PANEL

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Abstract: In our universe there are many galaxies and planets, in that the best planet is EARTH because it is easy to live here. In EARTH we have many sources which boost our lives up to an extent to live. So one of the sources that is gift from god which is the energy can be recreated commonly known as renewable energy. So this project is mainly based on one of the renewable energies which we can use to create into some form of energy. So there are many types of renewable energies but here we are using one of the highest and best sources of energy which comes from SUN. According to our project the energy source which we use can recreated day by day because the source of energy from the sun will never end. The energy starts from every morning increases hour by hour and makes bright our life. The source of energy which we see every day is high so we can use this energy in many ways like in the form of electricity. So this is our main aim to convert renewable source into other source especially electricity in this project. That tracker in our project detects the sun at dawn and tracks it for the entire day then it reset automatically for the next cycle in sense until when sun comes back again. The energy from the sun is stored and used. We can use the energy from the sun from both ways at the time of energy collected and the energy stored. Our project is used for many people especially who are having business like having many branches, so they replace with our project and get rid of electricity bill etc. If many people, follow this type of technology like making renewable sources into electricity we can save so much of electricity and we can make the cost decrease and low maintenance we can kept some good profit. The renewable energy we are using is SOLAR ENERGY from sun.

I. INTRODUCTION

The project defines a way for arranging of solar panels to receive maximum energy, radiation, source from the sun. The project is like a sunflower. In the name of sunflower we are having sun which explain the mechanism attract to the sun. to explain in detail the attract meaning is tracking as sunflower which does the following sun patterns. We can say it tracks the sun hundred percent and collect energy hundred percent. This is the work of sunflower to track and collect energy from the sun by applying same method we developed the project which is known as sun tracking solar panel. Which tries to track and collect the sun energy and to convert into some other form, especially electricity. This solar tracking system which can be used as a power generation method from sun light. The method of power generation is simple, and it is adopted from natural resource. The aim is to gain maximum intensity from sun to generate power. In recent surveys they claimed that the uses of electricity are rapidly increasing second by second. This leads to many problems like production of electricity, maintenance of electricity etc., which leads to the main problem increase of cost if this continues in the same manner there will be lack of electricity which makes the people suffer more to get sufficient power. To bring back to the era when electricity is started where many people are unable to access and see it's potential of it. To get rid of this problem we can use technology like where the renewable sources are converting into another segment to complete the work this can help to electricity to use only in certain times when it is need more and in important situation. This application can make many useful sources to hand over to next generations. So they can experience the amount of source and even they can develop to the next level. They can make the life better and peaceful. We need to start it from today by saving our sources like electricity, water etc. In our project we are mainly focusing on save the electricity. By following the technology which deals with natural energy in technical language inbuilt which means it as potential or characteristics itself. So the characters here define natural source to be more specific natural energy the best part of this is the energy is infinity if we use today it again creates itself tomorrow so we can say it will recreate itself every day. This characteristic which defines in above sentence is sun. The sun is one of the finest sources of energy. In India we see sun is not only a source of energy or star we see him and pray him as god which brings us light in life's and health in our body now according to science sun is energy source and star which earth and other planets revolve around him to complete their revolutions now according to the technology or engineers the sun is source of many ways. According to technology the sun produces uv rays which is useful in many ways for living beings and projects done by living beings by using one of the benefits from the sun the solar energy which has potential to do work or make things work like electricity. We are aiming to get maximum efficiency

from the sun in the form of solar energy the panel we are using is a solar panel which easily can define the panel made to extract the maximum energy from sun. if it is in a particular position it can only extract maximum energy only for certain time. This is biggest drawback of solar panels. So our technology aims the panel to track and collect the energy from the sun (i.e. from sunset to sunrise).

LITERATURE SURVEY:

[1] Describes a two- axis solar tracker capable of withstanding the extreme weather conditions. The solar tracker includes a solar array, a frame, a base, a pivot frame, and a first and second actuator. The solar array is mounted to the frame and captures sunlight. The base is pivotally connected to the frame and defines a pivot axis for elevational movement of the solar array. The pivot frame is also pivotally connected to the frame and defines a pivot axis for azimuthal movement of the solar array. The base is pivotally connected to the frame and defines a pivot axis for elevational movement of the solar array. The pivot frame is also pivotally connected to the frame and defines a pivot axis for azimuthal movement of the solar array. The first actuator controls elevational movement of the solar array and the second actuator controls azimuthal movement of the solar array. The solar tracker is pivotable between a raised position and a stowed position.

[2] Object of his invention to mechanically link multiple solar trackers in a large array configuration so that they may operate in unison, driven by a single motor and tracker controller, whereby the mechanical linkage system is designed such that it must only be capable of withstanding the relatively low forces required to effect movement of the trackers without the requirement to resist larger wind forces acting on the array of trackers. Another object of his invention is to apply the drive principles to various solar single axis tracking geometries to maximize the economic performance for each solar tracking application. Multiple gearboxes can be mechanically linked by drive shafts and driven by a single motor. The drive shafts may incorporate universal joints for uneven terrain or staggered configurations. Harmonic dampers can be affixed to the solar panels to decouple wind forces which allow the use of larger solar panels.

[3] Refers to a solar collector which may receive and direct solar radiation onto a photovoltaic (or, solar) cell. A concentrating solar collector may also convert the received solar radiation into a concentrated radiation beam prior to directing the radiation onto the solar cell. In some aspects, determination of the target tracker position in the second coordinate system includes subtracting 360° from an azimuth angle in the first coordinate system if the azimuth angle in the first coordinate system is between $+180^\circ$ and $+360^\circ$, wherein the azimuth angle in the second coordinate system is determined to be equal to the azimuth angle in the first coordinate system if the azimuth angle in the first coordinate system is between 0 and $+180^\circ$.

[4] Describes a conventional solar tracker employing controllable moveable solar panels to expose them continuously to the path of the sun both throughout the day and throughout the year. For example, reference may be made to U.S. Pat. No. 6,058,930. The system may comprise of a solar panel array assembly having at least two attachments, a support anchor assembly for attaching to a surface and having at least two attachments, and a support structure including a plurality of elongated support rods for securing the array assembly above the support anchor assembly. Each support rod may be attached at one end to one of the attachments of the solar panel array and attached at the other end to one of the attachments of the support anchor assembly.

[5] Narrates a method, apparatus, process of manufacture for determining the attitude of a spacecraft having at least one star sensor. The method comprises of the steps of selecting a first reference star sensor from among the star sensors; designating two stars observed by the first reference star sensor as a primary star pair; identifying a candidate star pair corresponding to the primary star pair, wherein the candidate star pair is selected from a star catalog having a plurality of entries; estimating an inertial orientation of the first star sensor at least in part from the identified candidate star pair; and determining the spacecraft attitude from the estimated inertial orientation of a reference star sensor selected from a group comprising the first star sensor.

[6] Discusses different types of sun-tracking systems and their cons and pros. The most efficient and popular sun-tracking device was found to be in the form of polar-axis and azimuth/elevation types.

METHODOLOGY:

WORKING PRINCIPLE:

The use of solar trackers can decrease production of electricity up to an extent so in some regions the survey is claiming 40 percent of electricity production can decrease. Some scientist researched on places like overheat moderate and kind of cool the percentages are 40 in hot regions, 35 to 25 in moderate and below 15 percent in cooler regions. By the research they come to know the place of desert example like Sahara Desert is covered half of its area with solar trackers it can produce the energy which can supply overall a country which we are taking under the need of electricity can replace by solar energy. It can easily produce the amount of electricity needs to daily life. But every place does not like a desert where it observes sun. in every there is sun light which we can feel according to the level of place but to make it hundred percent efficient we are using technology which we got idea from the work of sunflower. The work of sunflower is to get hundred percent of energy from sun and utilize as food and to grow to survive. In the same way we are using the energy from the sun commonly known as solar speaking technically converting solar energy into electrical energy. The solar energy we can use in many types of energy like mechanical rotational and some type of static forces, but we are especially focusing on electricity. The angles sun will not be the same it changes from time to time with angle, intensity energy changes time to time. If we are not able to focus on that angles at that time of sun moment, we are not able to catch or focus on hundred percent of intensity. Majority of solar panels stick to particular position which are not able to gain hundred percent intensity they are only able to get hundred percent of intensity only at certain time in certain angle. So our project focuses to make the perfection in the gaining of intensity source of energy from the sun hundred percent. Now let's go into some more details how the project works. As we described already our main aim is to track renewable energy in our project in the action of technology we are using the renewable energy hundred percent usage. This may give us action to use the potential of nature by using technology.

BLOCK DIAGRAM:

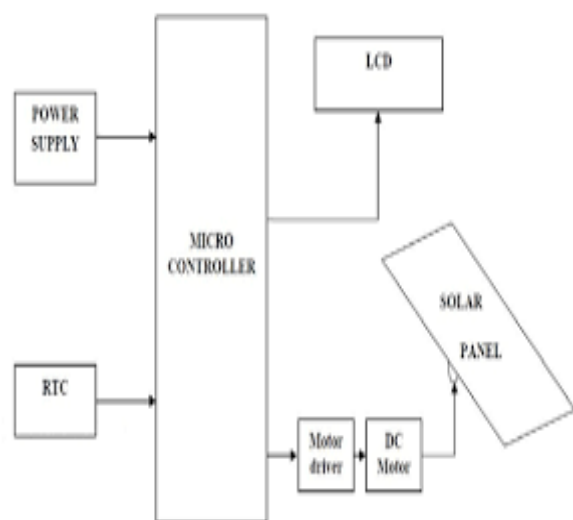


Fig 1.1 – BLOCK DIAGRAM

Describing the components in the block diagram. It is divided in to two types.

1. Hardware Tools
2. Software Tools

The components comes under the category are

- Solar panel (made with sillicon plate)
- Light detecting sensors
- Stepper motor
- Turn table
- Panel holder
- PIC microcontroller(ATmega 328)
- Voltage regulator

The software used in the project.

- Keil compiler

The above tools are used to create our project and to show case our aim which to gain maximum energy from the sun at all the time and to convert the energy successfully into electricity. Now let's see how model will work by using PIC microcontroller to gain all the intensity. The method we used here is 180 degrees movable or flexible panel which aims to observe all the power from the resource we are using. The resource here is sun and the energy we observe is solar energy.

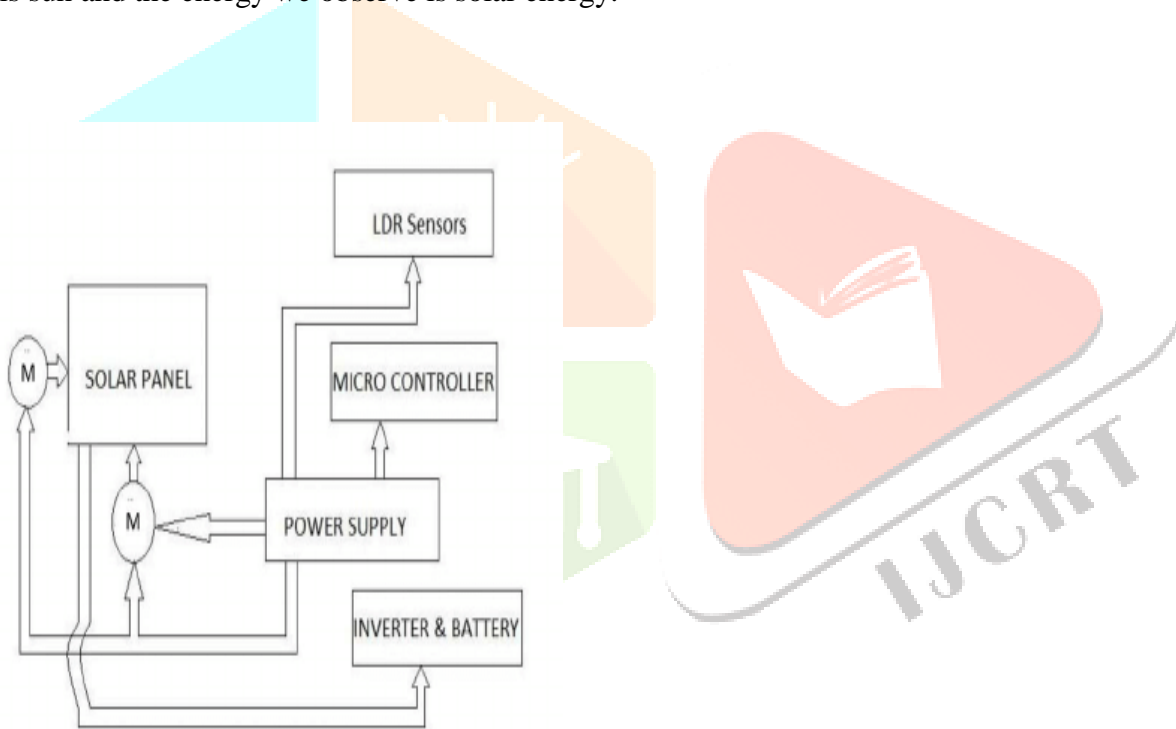


Fig 1.2- METHODOLOGY DIAGRAM

Sun tracking solar panel consist of two LDR's solar panel and a servo motor and AT mega 328 microcontroller two light dependent resistors are arranged on the edges of solar panel. Light dependent resistors produce low resistance when light falls on them. The microcontroller has a basic roll it acts according to its program.

The other component stepper motor place key role in this project. It directs the panel towards the sun. we can

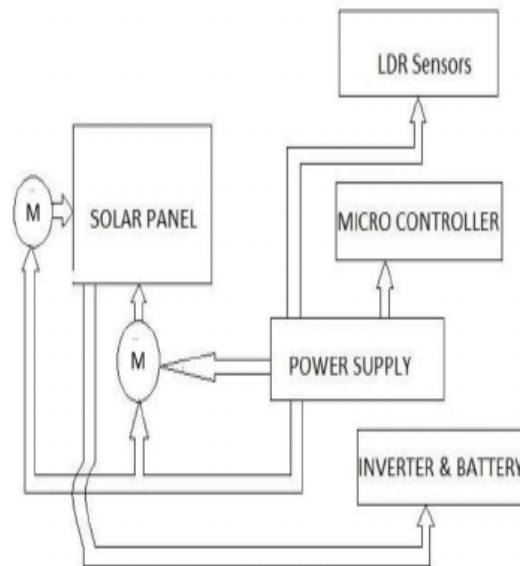


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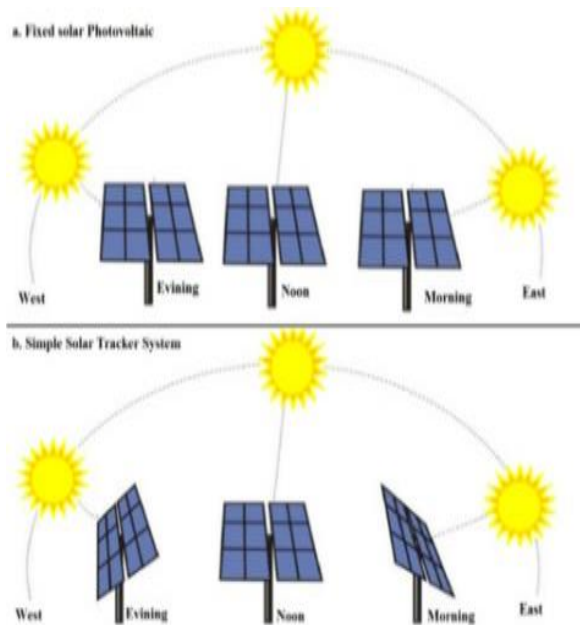


Fig 1.3- ACTION PLAN

By observing the above action plan we can easily get the mechanism of the project. It is very simple the sun starts at one point and ends in opposite point like east to west. The solar panel, which is designed to collect the energy from sun, but it was fixed only at one point it can collect very less amount of energy as compared to total active time of sun. it collects only in particular time so to get rid of this problem we added the panel to move towards the sun's direction as the sunflower does. In result which we can gain high intensity from starting to end movement of sun in every single day. Let us discuss about the component.

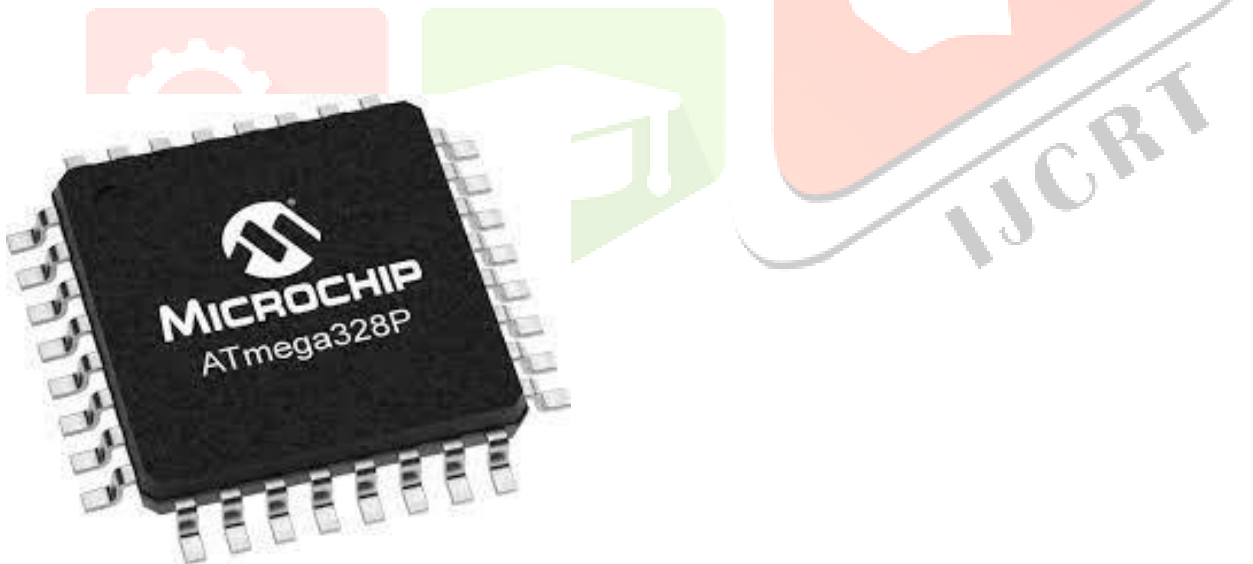


Fig 1.4- MICROCONTROLLER

Microcontrollers are the best invention which changed the era of electronic and integrated circuits. Before microcontrollers, the IC are capable of doing task up to a limit here, we got the microcontroller which can do many tasks in a single chip.



Fig 1.5-SOLAR PANEL

This equipment is one of the vast energy grabbing devices. Especially this is made with silicon plates to fill the action collecting the energy from the sun. We used this equipment as a source to collect maximum amount of solar energy and designed it to get maximum amount of intensity from sun rise to sunset.

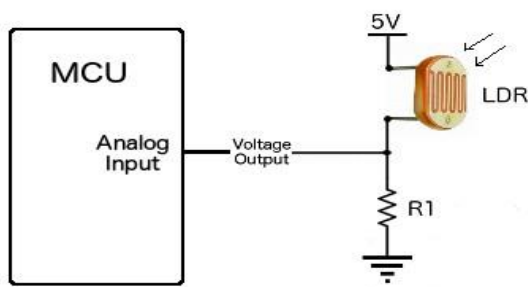


Fig 1.6- LDR SENSOR

Light dependent resistor is commonly known as LDR sensor. The main work of LDR sensor is to indicate the presence and absence of light when the light intensity increases the LDR comes into action and to use the source of energy. If the intensity increases the amount energy can be consume will be high.

EXPERIMENTAL RESULTS:

After making the connections like taking the solar panel and connecting to the microcontroller which is coded to sense direction of sun for the movement and the intensity of the sun for the energy where the solar panel track and collects with the help of microcontroller. The work of solar panel is to collect energy from the sun. The work of microcontroller is to track the direction of sun with the LDR sensor and microcontroller is power supplied and also consists of stepper motor and led which are signal for the output conversion of one energy source to another energy source.

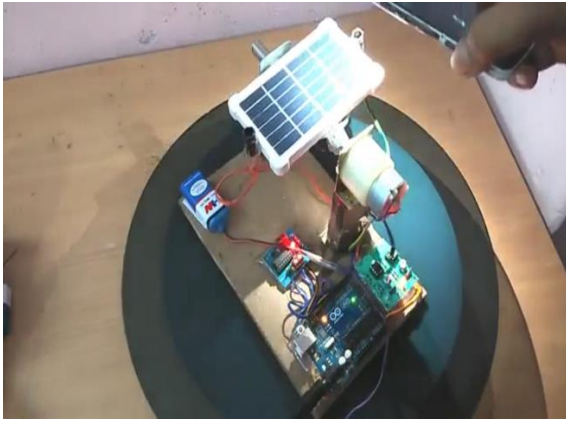


Fig 1.7- EXPERIMENTAL OUTPUT1

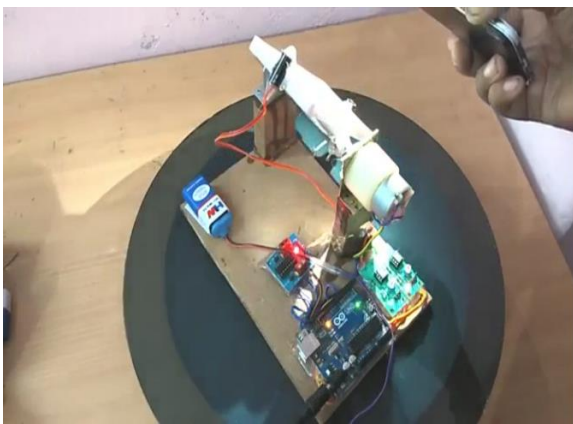


Fig 1.8- EXPERIMENTAL OUTPUT2

CONCLUSION:

This device is very effective, high efficiency, good response and continuous tracking the maximum power point. The system is able to track the sunlight and collect the maximum intensity to produce output. We developed this technology to make good source of energy conversions. Sunlight has two components the direct beam that carries 90 percent of solar energy and diffuse sunlight that carries the remaining portion. The diffuse portion is the blue sky on a clear day and is a large proportion of total and cloudy days, so the majority of energy is in the direct beam.

REFERENCES:

1. The US Patent no. 0215199 A1 [2007] by Robert H. Dold describes a two-axis solar tracker capable of withstanding the extreme weather conditions. The solar tracker includes a solar array, a frame, a base, a pivot frame, and a first and second actuator. The solar array is mounted to the frame and captures sunlight.
2. The US patent No. 0308091 [2008] by Ronald P Corio claims as an object of his invention to mechanically link multiple solar trackers in a large array configuration so that they may operate in unison, driven by a single motor and tracker controller, whereby the mechanical linkage system is designed such that it must only be capable of withstanding the relatively low forces required to effect movement of the trackers without the requirement to resist larger wind forces acting on the array of trackers.
3. Qiang Xie's US Patent No. 0051017 A1 [2010] refers to a solar collector which may receive and direct solar radiation onto a photovoltaic (or, solar) cell. A concentrating solar collector may also convert

the received solar radiation into a concentrated radiation beam prior to directing the radiation onto the solar cell.

4. A US patent No. 0293861 by William F Taylor [2009] describes a conventional solar tracker employing controllable moveable solar panels to expose them continuously to the path of the sun both throughout the day and throughout the year. For example, reference may be made to U.S. Pat. No. 6,058,930.
5. David D Needelman in his US patent No. 0009284 A1 [2009] narrates a method, apparatus, process of manufacture for determining the attitude of a spacecraft having at least one star sensor. The method comprises of the steps of selecting a first reference star sensor from among the star sensors; designating two stars observed by the first reference star sensor as a primary star pair; identifying a candidate star pair corresponding to the primary star pair, wherein the candidate star pair is selected from a star catalog having a plurality of entries; estimating an inertial orientation of the first star sensor at least in part from the identified candidate star pair; and determining the spacecraft attitude from the estimated inertial orientation of a reference star sensor selected from a group comprising the first star sensor.
6. Hossein Mousazadeh, [2009], in Renewable & Sustainable Energy, Vol. 13, 1800-1818 discusses different types of sun-tracking systems and their cons and pros. The most efficient and popular sun-tracking device was found to be in the form of polar-axis and azimuth/elevation types.
7. Nader Barsoum [2010], Global Journal on Technology, Vol.01, 1985-9406 states that research has proved that solar tracking system with single-axis freedom can increase energy output by approximately 20%, whereas the tracking system with double axis freedom can increase the output by more than 40%.
8. J. Rizk, [2008], World Economy of Science Engg. & Tech. Vol.41 states the potential system benefits of simple tracking solar system using a stepper motor and light sensor. A solar tracking system is reportedly designed, implemented and experimentally tested. The design details and the experimental results are discussed. A solar tracker is designed employing small solar cells to function as self-adjusting light sensors, providing a variable indication of their relative angle to the sun by detecting their voltage output.

