SOLAR TREE

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Abstract: Now a days oil supply is decreasing therefore energy sources are becoming limited throughout the world. The technology of using biofuel is an alternate solution of energy sources but if we think that all the worlds vehicles will be powered by bio fuels then the amount of the land used for farming must be doubled abundant power is produced by nuclear energy but many fears from the emission of catastrophes from such a sources in all these solar tree proves to be most beneficial source of energy this paper present solar tree implementation as a alternate source of energy in urban cities a new idea of solar tree design us in nano wire solar cells is presented. Nano wire processes high physical light absorption properties which can be improved tremendously hence we can say that it is a revolutionary urban lighting concept and these technologies need to development of high efficiency solar energy.

I. INTRODUCTION

During the last few years the renewable energy sources like solar energy have gained much important in all over the world difference types of renewable or green energy resources like hydro power, wind power & biomass energy are currently being utilized for the supply of energy demand among the conventional renewable energy sources, Solar energy is the most essential an prerequisite resource of sustainable energy[3]. In solar trees, PV panels or cells are arranged in a Fibonacci series pattern instead of leaves. The solar tree produces more power than a conventional flat arrangement of solar cells. It requires only 1% land as compared to the conventional flat arrangement. These solar trees have been designed to provide different means of power to different urban and built environments. These ranges from powering mobile phones, electric cars, buildings and street lighting and covering large and small scale area. Solar trees are really a practical solution for urban street lighting. There is a rapid increase in the use of PV systems in India due to continuous reduction in prices of solar cells. But there are some hurdles for adoption of this technology in rural and remote areas due to the security of the system and its components from theft. Most of the rural street lighting PV system installed by the government is not in working conditions because of above-mentioned reasons and lack of maintenance. Hence presently PV systems prove to be suited mainly for urban & corporate use. Still, there is less response for use of PV system for domestic applications due to higher initial cost and area required for mounting such systems[1]. Over 65% of world's power generation is dependent on fossil fuels. Since fossil fuels are depleting at an alarming rate, the shift to renewable resources has been significant in recent years. Of all the renewable energy sources, solar energy is widely used due to the following reasons: Availability all throughout the year; it's easier to tap than other sources; and easier to set up a standalone generating station using solar panels. The power output of photovoltaic panels changes with insolation and panel temperature. Insolation and temperature have a non-linear characteristic with respect to power output. To maximize the power output, researchers have been using various Maximum Power Point Tracking

II. PROBLEM FORMULATION

We are going to design solar tree so it solve the problems of energy demand of people & saving of land. It reduce the dependence on grid power daily average energy requirement of small Indian family. By using the Double axis tracking gives successfully more electrical output as compared to static positioning of the panels. The Nano leaves is the advance technology which generate electrical energy gives electrical power output from atmospheric conditions like heat, wind, & sun. These proposed model system generates electrical energy from renewable sources.
Concept and Objective of the solar tree is explained below

Concept
Tree stand for
T=Tree Generating
R=Renewable
E=Energy and
E=Electricity
The concept of the work is to overcome the
1)It required less land as compared to solar panel.
2)It grabbing the electrical power or energy through a great ease.
3)A positive environmental impact opposes to negative one.
4)No air pollution energy sources.
5)People cam save money.

Objective
The aim of our project is to utilize the maximum solar energy through solar panel for this automated sun tracking is proposed.This project helps solar power generating equipments to get the maximum sunlights thereby increasing the efiiciency of the system.The solar panel tracks the sun from east to west automatically for maximum intensity of light.

III. WORKING PRINCIPLE

Sunlight striking the photovoltaic cell is absorbed by the cell.Sunlight striking the photovoltaic cell is absorbed by the cell. The energy of the absorbed light generates particles with positive or negative charge (holes and electrons), which moves about or shift freely in all directions within the cell.

Conversion of light energy in electrical energy is based on a phenomenon called photovoltaic effect. When semiconductor materials are exposed to light, the some of the photons of light rays are absorbed by the semiconductor crystal which causes significant number of free electrons in the crystal. Photovoltaic cell is the basic unit of the system where photovoltaic effect is utilized to produce electricity from light energy.

IV. MODELLING AND ASSEMBLY

Two DC gear motors is necessary for dual axes tracking for two different axes. A motor driver IC named L293D is used here for interfacing the motor with Arduino. The principle of the solar tracking system is done by Light Dependant Resistor (LDR). Four LDR's are connected to Arduino analog pin A_0 to A_3 that acts as the input for the system. The built-in Analog-to-Digital Converter will convert the analog value of LDR and convert it into digital. The inputs are from analog value of LDR, Arduino as the controller and the servo motor will be the output. LDR1 and LDR2, LDR3 and LDR4 are taken as pair .If one of the LDR in a pair gets more light intensity than the other, a difference will occur on node voltages sent to the respective Arduino channel to take necessary action. The DC gear motor will move the solar panel to the position of the high intensity LDR

NANOLEAF

Nano leaf is thin like a natural leaf and the wind outside forces pushes the Nano leaf back and forth, and in petiole, twig and branches mechanical stresses appears. When thousands of Nano leaves flap back and forth due to wind millions of Pico watts are generated. Stronger the wind and more energy is generated. A small part of the sunlight is reflected by Nano leaves that strikes them. Rest of the spectrum and the green light is efficiently converted into electricity. Nano leaves converts the visible light and invisible light, known as infrared light or radiation, which can feel only. In Nano leaves has unique combination of photovoltaic and thermo voltaic and converts thermal radiation into electricity[4].

The Nano leaves is the advance technology which generate electrical energy gives electrical power output from atmospheric conditions like heat, wind, & sun.
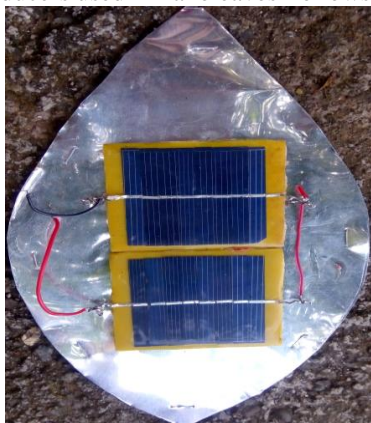
Types of tranducers used in nanoleaves Follows:-

Fig1 Photovoltaic Cells

Fig2 Thermovoltaic Cells

Fig3 Piezoelectric Cells

Sr no.	Time	Current	Voltage	Power
1.	11:30am	8.73	0.063	0.549
2.	12:30pm	8.81	0.071	0.625
3.	01:30pm	8.83	0.072	0.635

Table1 Testing Table-Nanoleaves Reading

The various component of "Solar Tree" is done as follows:

- Arduino is an open source computer hardware and software. Arduino board designs use a variety of microprocessors and controllers.
- L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.
- A photoresistor (or light-dependent resistor, LDR, or photo-conductive cell) is a light-controlled variable resistor.
- A solar cell or photovoltaic cell is a device that converts solar energy into electricity by the photovoltaic effect.
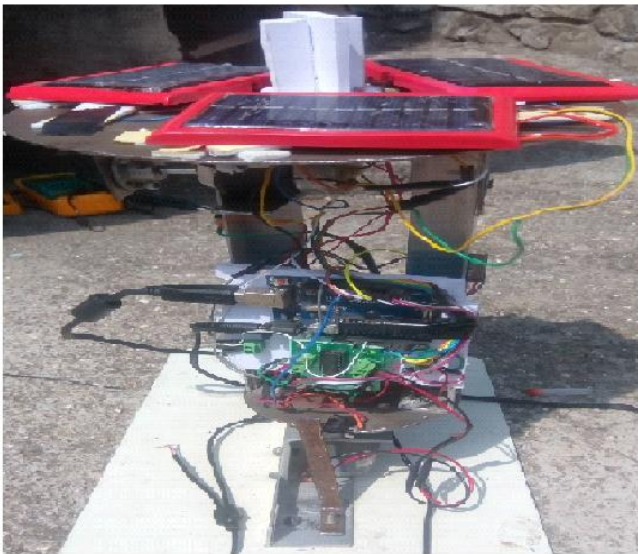
Fig.4 Final Assembly of Solar tree

Fig.5 Comparison of current versus time curve for the static panel and continuous tracking system

V. TESTING AND ANALYSIS

The test we conduct on day time was the time taken for One way to make the solar panel more effective is by adding the ability to track the sun as it moved across the sky.A solar tracker is a device used for a solar PV panel towards the sun by using the light sensors interfaced to motors,used for rotation .The motor can be used to move the panels either along one or two axes. In this way when the sun rays are occurred on the panel the solar tracker is moved by using LDR either in one or two axes then we took the reading of solar tree model as on the static and tracking both positioned.

VI. RESULTS

The test we conduct in Ahmednagar Vilad Ghat. Table shows the current and voltage values received from the static panel and continuous tracking system for different times in a day. from the table it is seen that at 8:30am there is much improvement in current by both the tracking systems compared to the static panel. But as time goes on the difference in current among these system decreases up to around 11:30am.Aafter that when the sun rotates more towards west this difference increases again. The highest current of static panel and continuous tracking system is 0.074am and at 01:30pm. But in case of voltage the variation is less compared to current as the voltage has no direct relation with the sun light intensity.

Sr.No.	Time	Static Position Reading			Tracking Position Reading		
		Voltage(V)	Current(A)	Power(W)	Voltage(V)	Current(A)	Power(W)
1.	8:30.AM	17.85	0.017	0.30345	17.92	0.023	0.41216
2.	9:30.AM	17.75	0.032	0.568	17.93	0.035	0.57376
3.	10:30.AM	17.7	0.037	0.6549	17.94	0.048	0.66378
4.	11:30.AM	17.7	0.053	0.938	17.9	0.067	1.199
5.	12:30.AM	17.93	0.064	1.147	18.2	0.082	1.492
6.	01:30.AM	18.13	0.074	1.341	18.22	0.084	1.53
7.	02:30.PM	17.28	0.068	1.175	17.67	0.071	1.254
8.	03:30.PM	17.11	0.052	0.88972	17.7	0.059	1.0443
9.	04:30.PM	16.98	0.028	0.47544	17.55	0.051	0.89505
10.	05:30.PM	16.9	0.022	0.3718	17.48	0.049	0.85652

Table2 Testing table-Power values of static and tracking panel at different times in a day
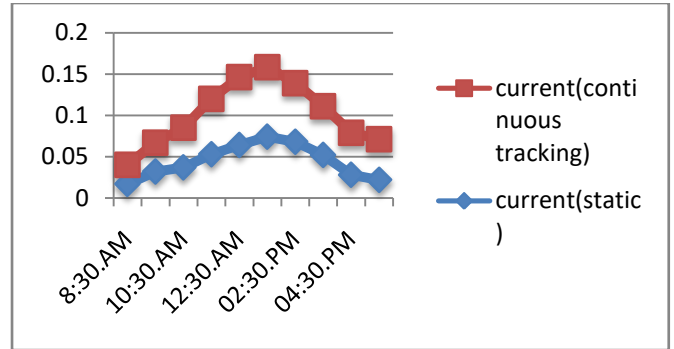
VII. CONCLUSION

The Solar Tree concept is very successful to fulfill the increasing energy demand of people & saving of land. It reduce the dependence on grid power daily average energy requirement of small Indian family. The initial investment cost of solar tree is also equal to same capacity PV systems as other system components are similar. The overall cost of the domestic solar tree can be reduced by using the available local material. To reduce cost the design of tree structure should be simple and innovative. The performance of solar tree better than conventional rooftop mountings as manual or low-cost auto tracking system can be easily incorporated. The initial investment cost is the major concern in PV system. The payback period of proposed system seems to be high but due to continuous increase in the cost of grid power and reduction in the cost of PV cell due to technological advancement long payback period can be compensated.

Double axis tracking gives successfully more electrical output as compared to static positioning of the panels. The Nano leaves is the advance technology which generate electrical energy gives electrical power output from atmospheric conditions like heat, wind, & sun. These proposed model system generates electrical energy from renewable sources.

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