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# Solar Tree - The way of future

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**ABSTRACT:** Now a days with the growing population and energy demand we should take a renewable option of energy source and should keep in mind that energy should not cause pollution and other natural hazards. In this case the solar energy is the best option for us.

India is a highly populated country, so we should take the advantage of such an energy which require very less space to produce energy efficiently. In this case solar tree could be the best one for us. We can also use the technique called “SPIRALLING PHYLLATAXY” to improve the efficiency of the plant. It can be applied in street lighting system, industrial power supply etc. It is much better than the traditional solar PV system in area point of view and also more efficient. So this will be a very good option and should be implemented. In terms of area, it is far superior to traditional solar PV system, and it is also far more efficient. As a result,that is a fantastic solution that should be introduced.

**KEYWORDS:** Solar Tree, Solar Tracker, Renewable energy, Charge Controller, Arduino Nano.

## I. INTRODUCTION

As conventional energy sources are exhausted rapidly everyone looking towards non-conventional Energy sources. Solar energy is the best option when we looking for non-conventional energy source. Because it is very easy to trapped the solar radiations and convert it into electrical energy by using Photovoltaic (PV) cells. The only problem occurs when we use solar energy is that a large space is required for an installation of big solar panels for higher outputs so it can be solved by this new product known as “**Solar Tree – The way of future**”.

Solar energy is available in abundance and considered as the easiest and cleanest means of collecting the renewable energy. For direct conversion of solar radiation into usable form, we have to follow; solar thermal, solar photovoltaic and solar architecture. However, the main problem associated with collecting solar energy is the requirement to install large solar collectors requires a very large space. To overcome on this problem, we can install a solar tree in spite of a no of solar panels which require a very small space.

A **Solar tree** is a structure incorporating solar energy technology on a single pillar, like a tree trunk. It may be a solar artwork or a functional power generator. Sola tree having a pole made up of metal and solar panels are placed on different poles having an arrangement like branches of a tree looks like as a artificial tree like a structure which generates electricity from sunlight by using PV cells. Solar energy collected by solar panels converted into electrical energy and then stored into batteries which can be further used as per requirements.

## II. WORKING

### Objective of proposed methodology:

Instead of traditional solar PV system we can use “**Solar tree**” by placing a Photovoltaic panels on poles. Solar tree take only 1% of space than traditional system. Solar tree save space and produce efficient energy.

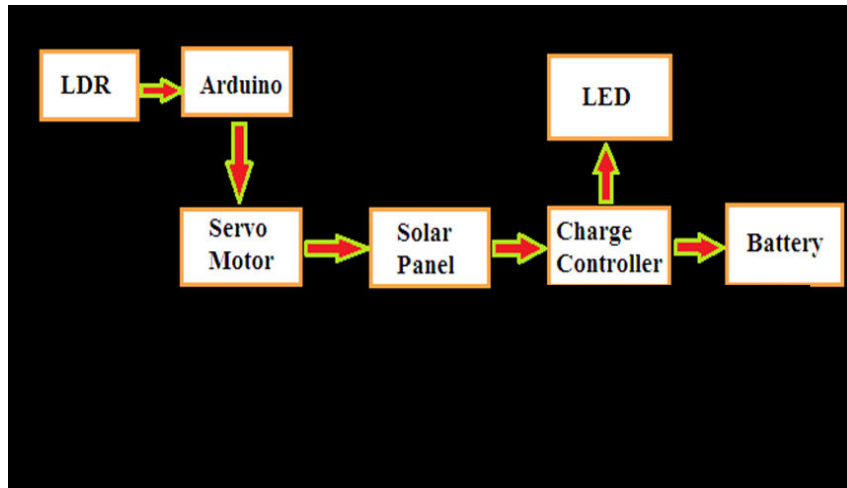
### Proposed Work:

The aim of our project is to build a solar tree using solar panels and store energy in batteries and use it as per our requirement. The proposed work is as follows:

- 1) Attach Solar Panels on branches of solar tree.



- 2) Electrical energy collects into charge controller.
- 3) All collected energy stored into batteries through charge controller.
- 4) Interface LED as an output module.



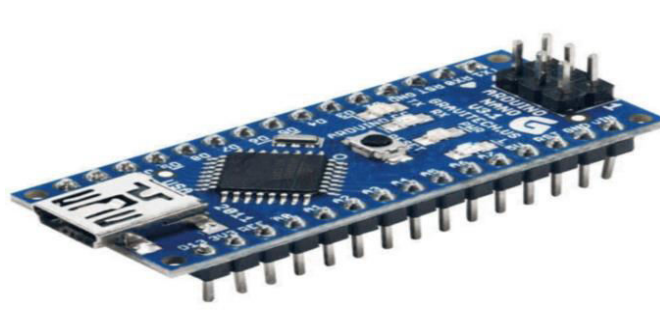
The main thing for installing solar tree is to collect maximum solar energy by using sun tracking solar. For this purpose, LDR plays an important role. The analog output of LDR is given to analog pins of Arduino Nano. Inbuilt ADC of Nano converts it into digital output. Servo motor is used to rotate the solar panel. Solar panel collects sunlight radiated from the sun. PV cells convert sunlight into electric energy and this effect is known as photovoltaic effect. Charge controller collects all amount of electric energy. Batteries gets charged during day time. Batteries are also used to store the energy so that we can use it at night and in cloudy days when no sunlight is there. At the end, LED is used as output module.

### III.HARDWARE SPECIFICATIONS

Above figure shows the basic block diagram of the Solar Tree, mainly four components are used. With the help of that solar tree works.

#### Arduino NANO:

Arduino Nano is one type of microcontroller board, and it is designed by Arduino.cc. It can be built with a microcontroller like Atmega328. There are totally 14 digital Pins and 8 Analog pins on your Nano board. The digital pins can be used to interface sensors by using them as input pins or drive loads by using them as output pins. A simple function like pinMode() and digitalWrite() can be used to control their operation. The operating voltage is 0V and 5V for digital pins. The analog pins can measure analog voltage from 0V to 5V using any of the 8 Analog pins using a simple function like analogRead(). It doesn't have any DC jack so that the power supply can be given using a small USB port otherwise straightly connected to the pins like VCC & GND. Arduino Nano is used for prototyping of electronics products and system also in project required multiple I/O interfaces and communications.



**Light Dependent Resistor (LDR):**

An LDR or light dependent resistor is also known as photo resistor, photocell, photo conductor. It is one type of resistor whose resistance varies depending on the amount of light falling on its surface. When the light falls on the resistor, then the resistor changes. These resistors are often used in many circuits where it is required to sense the presence of light. These resistors have a variety of functions and resistance. For instance, when the LDR is in darkness, then it can be used to turn ON light or to turn OFF a light when it is in the light. A typical light dependent resistor has a resistance in the darkness of 1M $\Omega$ , and in the brightness a resistance of a couple of k $\Omega$ .



**Servo Motor:**

Servo motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servo motors. Servo motors are not a specific class motor although the term servo motor is often used to refer to a motor suitable for use in a closed-loop control system.



**Solar Panel:**

A solar panel is a collection of solar cell. The solar panel converts the solar energy into electrical energy. The solar panel uses Ohmic material for interconnections as well as the external terminals. So the electrons created in the n-type material passes through the electrode to the wire connected to the battery. Through the battery, the electrons reach the p-type material. Here the electrons combine with the holes. So when the solar panel is connected to the battery, it behaves like another battery, and both the systems are in series just like two batteries connected serially.



#### IV. RESULT AND DISCUSSION

Fig shows the working prototype model of Solar Tree.

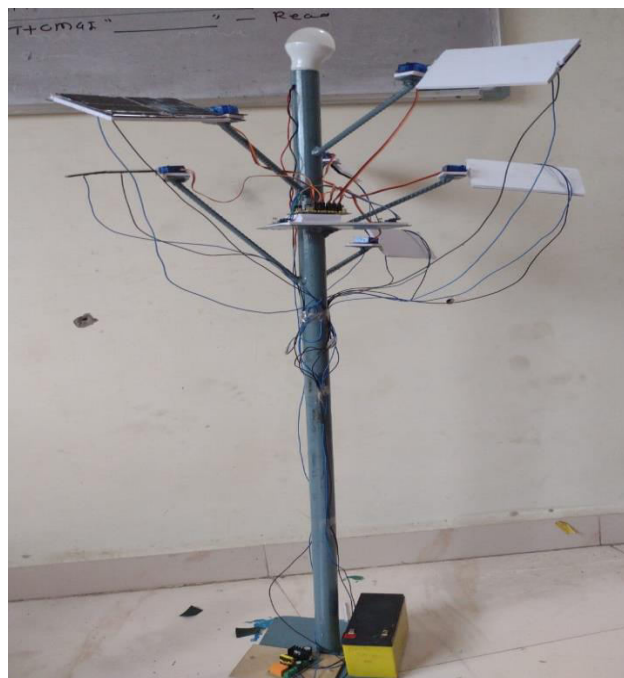


Fig. Prototype Model

#### V. CONCLUSION

An Arduino solar tracker was designed and constructed in the current work. LDR light sensors were used to sense the intensity of the solar light occurrence on the photo-voltaic cells panel. Conclusions of this project is summarized as the existing tracking system successfully sketched the light source even it is a small torch light, in a dark room, or it is the sun light rays. The Arduino solar tracker with servo motor is employed by means of Arduino ATmega328p microcontroller. The essential software is developed via Arduino Uno. The constant reliability of this solar tracker creates it suitable for the rural usage. The purpose of renewable energy from this paper offered new and advanced idea to help the people.

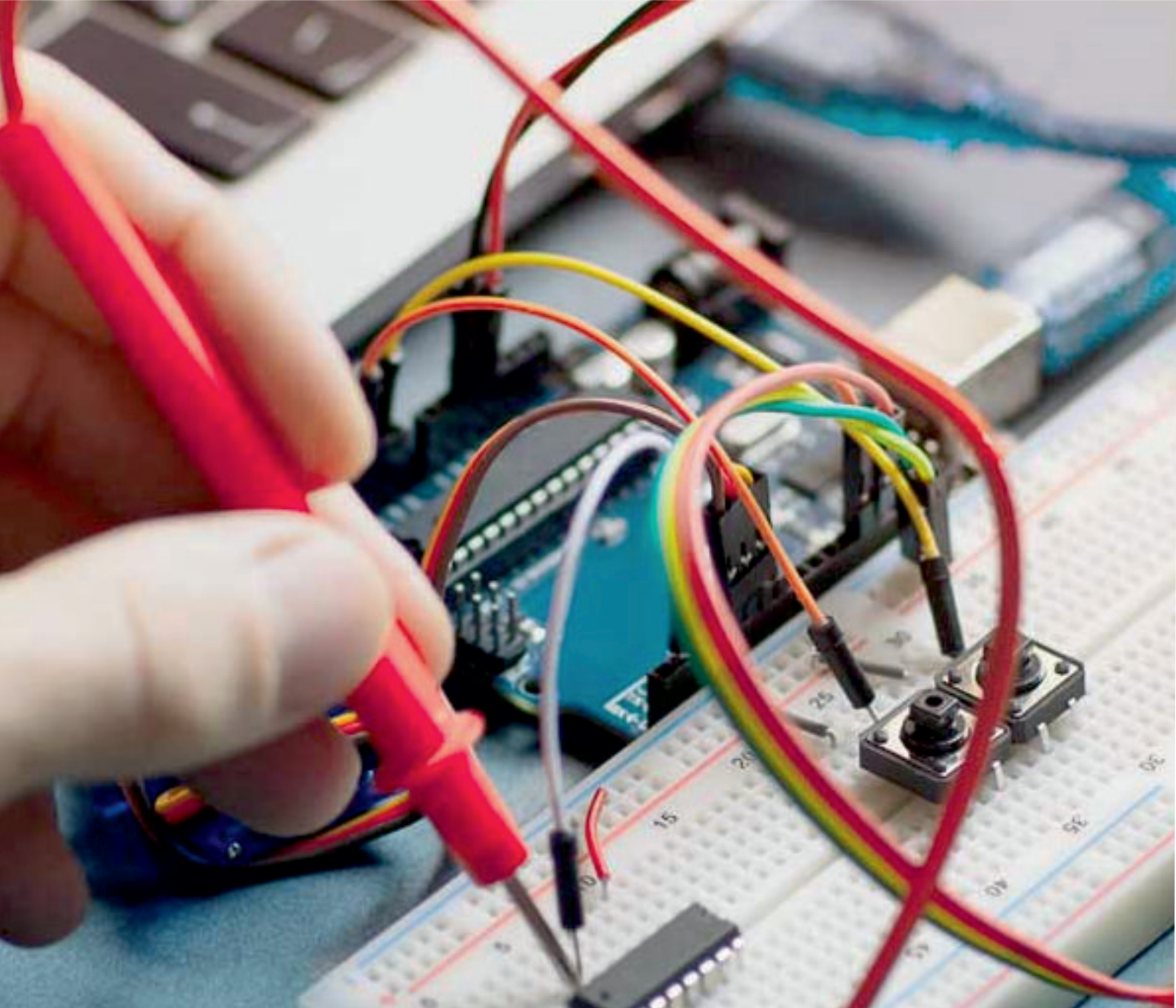


## VI. FUTURE SCOPE

Getting electrical power instantly. We charge our electrical vehicles and also enrich the environment with eco-friendly solar trees.

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