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# A Review on Horizontal Single Axis Solar Tracker Using Arduino Approach

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**ABSTRACT:** A plan discusses on is growth of a single horizontal axis solar tracker using Arduino UNO which is low & small complex & can still reached is the required efficiency. For the magnification of horizontal single axis solar tracking system, five light dependent on a resistors (LDR) has been utilized for sunlight optical discernment & is catch the maximum intensity light. A servo motor is appropriate to rotate the solar panel to the maximum light source sensing by the light dependent resistor (LDR) in order to magnification the efficiency of the solar panel & engender the maximum free energy. The efficiency of the system has been check & compared with the static solar panel on several time intervals. A little archetype of horizontal single axis solar tracking system will be concocted to implement the design methodology presented here. As a result of solar tracking system, solar panel will engender extra potency, voltage, current value & higher efficiency.

**KEYWORDS:** Solar Plate, Microcontroller, Single Axis Solar Tracker, Arduino UNO.

## I. INTRODUCTION

In this globalization era, injunctive authorization of electricity keeps on incrementing year by year. The authoritatively mandating of electricity gives an impact on the loss of main resources to engender electrical energy. Mankind have explored more ways and technologies for the production of electrical energy using the renewable energy resources. Renewable energy is an energy which generate from natural resources which are naturally replenished. Among all the renewable energy resources that have been discovered, solar energy is the most suitable. Solar energy is a free energy which does not have any price if using it. Furthermore, solar energy does not produce any pollution, environmental friendly and endless supplies. Solar energy is an energy generated by the sun in the form of solar radiation. Solar radiation from the sun is collected and absorbed by the solar panels and convert into electrical energy. Solar energy shows a great potential for conversion into electrical in India because it has very high radiation levels.

Despite of solar energy being a good source of energy, there is a desideratum to ameliorate the methods to harness this energy. This can be achieved by utilizing solar tracking system in lieu of fine-tuned system. This report presented to emerge with a conception to develop a single axis solar tracker for solar panel. The circuit is controlled by microcontroller, two dependent resistors (LDR) and a servo motor. The purpose of the research is to observe comparison of voltage reading between fixed and tracking solar panel. Solar panel assemble and connected to a stepper motor to track the sun so that maximum sunlight will be directly shine on the panel at any given time of the day and



year. This can deals with the design and execution of a solar tracker system dedicated to the PV conversion panels utilizing a single axis solar tracker contrivance to ascertain the optimization of the conversion of solar energy into electricity by opportunely move and turn the PV panel into the genuine position of the sunlight. This paper is for discussing on the important of using solar tracking system for extracting solar energy. The purposes of this research are to develop a tracking system that control and monitor the movement of solar panel based on the intensity of the light to quantify output voltage, current and puissance,  $P=IV$  and to compare the efficiency increase of a solar system between fine-tuned solar system and solar tracking system.

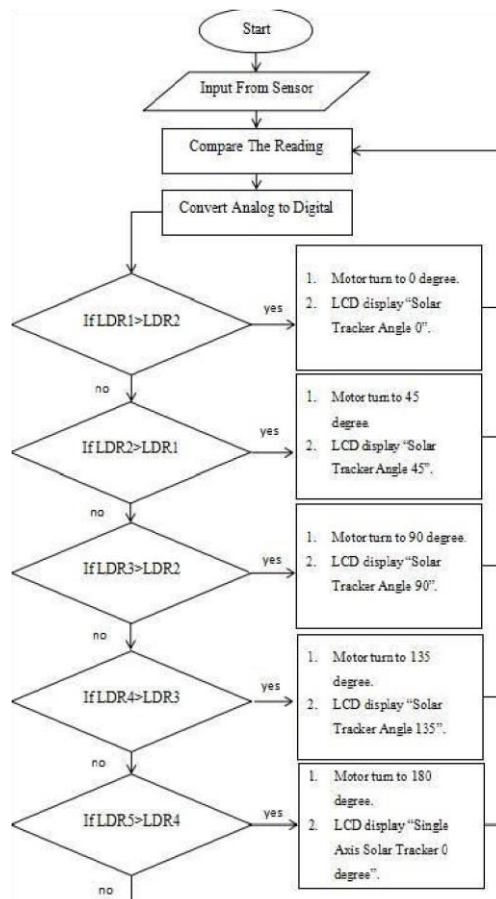


Fig.1. System Flowchart for Horizontal Single Axis Solar Tracker

## II LITERATURE SURVEY

Okpeki U.K proposed design and construction of uni directional solar tracking system. The tracker is constructed Using two segments electrical and mechanical part. Electrical part consists of PV sensor, comparator and battery whereas mechanical system consists of dc motors and gears. The device is mainly implemented by integrating it with 900V inverter and 12V, 100A battery. DC motors are tested for resistivity and induction. In the first segment voltage difference is detected by comparator circuit. It provides control input to driver circuit consisting of logic gates. An operational amplifier with power descipation of 830uW and two LM348W are connected to two sensor voltage dividers. The comparator is not able to handle such fast switching speed and logic gates cannot handle such high frequency input signals.

Aashir Waleed, B. Dr. KM Hassan proposed designing a single axis solar tracking system for optimum power. Solar tracker consists of 4 LDR sensors along with 2 stepper motor and a PIC microcontroller. Stepper motor has the ability to control the position but the controller needs to know the position of stepper motor during power up for this. Limiting factor is performance of stepper motor due to lack of feedback it might have to be restarted and it continues to consume power to lock in and hold the commanded position.





Ankit Ghate and RuhujaHiware proposed solar tracking development using arduino along with an efficient boost converter and charge. The system is based on the use of convetional dc to dc convertor and voltage change in LDR. Here voltage as well as tracking position can be done using the artificial intelligence algorithm. It results in single axis tracking. Sun’s path is not aligned accurately.

### III.PROPOSED SYSTEM DEVELOPEMENT

This section will be focusing on the methods used to develop horizontal single axis solar tracker using Arduino approach. It is divided into three sub-sections which include the specification of components, software design and hardware design.

#### (A) Specification of Components

This section discusses the components that used on this research.



**Fig: 2** single axis solar tracker

#### (B)Single Axis Solar Tracker

A solar tracker is a contrivance that orients a payload towards the Sun. This was initially designed to work like Venetian visually impairs with panel rows moving in unison throughout the day Single Axis Solar Tracker will focus on the hardware approach in designing and implementing. It tracks the sun east to west, rotating on a single point, moving either in unison, by panel row or by sections. It will gather less energy per unit as compared to the dual-axis trackers, but with shorter racking height, single axis solar track will require less space to install, creating a more concentrated system footprint and a more facile model for operations and maintenance.

#### (C) Arduino UNO

The Arduino UNO is a micro-controller board premise on . It has fourteen digital input/output pins (of which six of it can be apply as PWM outputs), six analog inputs, a 16 MHz crystal oscillator, a USB parallel, a puissance jack, an ICSP header, and a reset button. It contains everything needed to fortify the micro- controller; it can solely connect to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.



#### **(D) Servo Motor**

A servo motor can be employed with power supply from 4.8V to 6V. Customarily voltage of 5V with operating frequency,  $f_0 = 40\text{Hz}$  is used. Servo motor is utilized to give precise angle control such as 45 degrees, 90 degrees. The angle can be held permanent. It can rotate from 0 degree to 180 degrees when the pulse width modulation ratio transforms.

#### **(E) Solar Panel**

Electricity by the photo-voltaic effect, which is a physical & chemical occurrence. A solar cell is a contrivance whose electrical characteristics such as current, voltage and resistance vary when exposed to the sunlight. Poly-crystalline solar panels are utilized in this research. The designs of poly-crystalline..

#### **(F) Hardware Design**

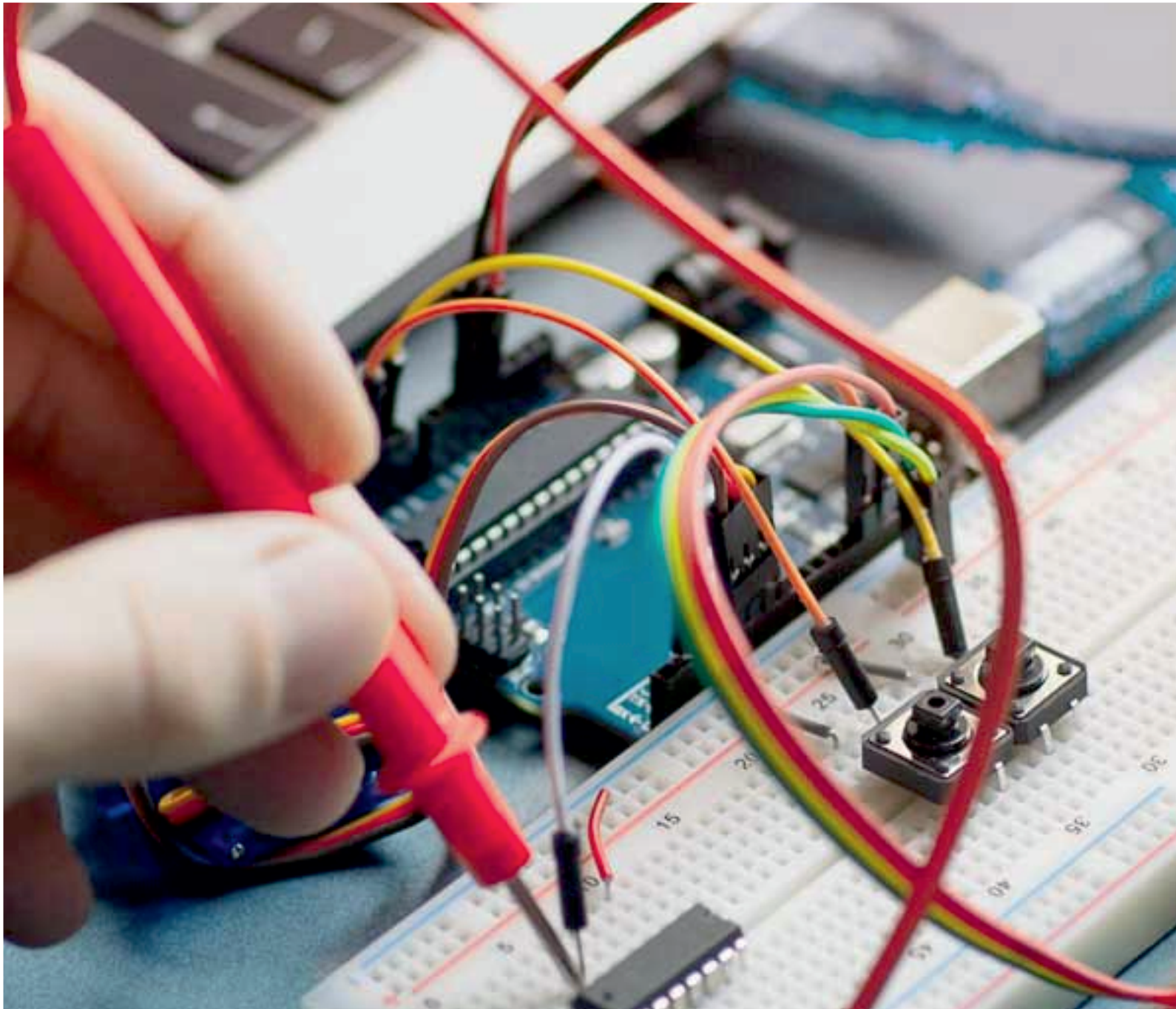
This section discusses the conception on hardware design for single axis solar tracker. The drawing of this archetype hardware has been designed by utilizing the Sketch Up 3D software.

### **IV. CONCLUSION**

An application of solar tracker utilizing Arduino approach has been presented in this study. As a conclusion, firstly the development of tracking system to control and monitor the kineticism of solar panel predicated on the intensity of the light is achieved. The solar panel will face the sun perpendicularly to absorb more solar energy. Secondly, solar tracking systems generate more output during the hours while fixed solar panel installation generates least power. However, shading effect gives a slightly impact for solar panel to produce the output value. Thirdly, the percentage efficiency of the system in energy conversion increases when implemented the tracking system. The efficiency gain varies significantly with altitude and the orientation of a fixed solar panel installation in the same location.

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