Survey On Dual Axis Sun Solar Tracker

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Abstract - In this paper, a performance analysis of dual axis solar tracker contains photovoltaic (PV) system is conducted, to evaluate the performance based on field data measurement. A dual-axis tracker with an algorithm named as maximum light detection which effectively applied on the solar energy generation system is being used. In a tropicalized country there has a massive cloud cover throughout the year, the sky condition is categorized as sunny, intermittent and gloomy. The relative results show that the system with dual axis tracker improved the energy generation significantly in possibly all sky conditions respectively.

***keywords* – Arduino UNO Battery Solar plates LDR.**

I. INTRODUCTION

Solar energy has greatest availability as compare to other energy sources. Solar energy is the more clean energy and easily utilized. The solar energy which is available in our environment can be used to convert into electrical energy by Solar Photovoltaic System (SPV). It is estimated that the earth surface receives 1000 Watts power per square meter during a sunny day. In recent survey the global energy shares of Solar based renewable energy is 24%, although it varies by regions and countries.

In India 21.22% energy shares is due to this renewable energy sources. India has set a goal of 175 GW renewable energy capacity by the year 2022 including 100 GW of Solar respectively.

As for now, a lot of energy source are come from nonrenewable source such as fossil fuel and coal and these sources are depleting so fast and thus a new, preferably renewable energy source is being required. Solar photovoltaic plates (PV) which converts photon in the sunlight into electricity is widely accepted for a cost-effective cleaner energy generation and as the technologies continue to advance.

II. SOME COMMONLY USED COMPONENTS

A. SERVO MOTOR

A servomotor is essentially a rotary machine or linear actuator that permits for perfection on control of angular or linear position, velocity and acceleration. It mainly contains an appropriate motor coupled to a sensor for position feedback. It also requires a comparatively motion controller, which may be a dedicated module designed specifically to be used with servomotors. A servomotor may be a closed-loop which is of a servomechanism that basically uses within the position feedback to regulate its motion and final position. The input to its control may be a signal (either analogue or digital) representing the position commanded for the output shaft respectively. The motor is paired with some type of position encoder to provide position and speed feedback for improvement. In the simple case, only the position is measured. The measured position of the output is compared to the command position and with the external input to the controller.

fig.1.Servo Motor

B. LDR (Light Dependent Register)

So Light dependent resistors, this LDRs or we will say photoresistors are often utilized in electronic circuit designs where it's necessary to detect the presence or the photovoltaic presence of a extent of sunshine.

These electronic components are often described by a spread of names from light dependent resistor, LDR, photoresistor, or maybe photo cell, photocell or photoconductor then on etc.

Although the opposite electronic components like photodiodes or photo-transistor also can be used, LDRs or the photo-resistors are a very convenient to use in many electronic circuit designs. they supply large change in resistance for changes in light level.

In view of their low cost, simple manufacture, and their simple use, LDRs has been utilized in a spread of various applications. At the one-time LDRs were utilized in photographic light meters, and even now they're still utilized in a spread of applications where it's necessary to detect light levels

fig.2.LDR

C. ARDUINO UNO

Here the Arduino Uno SMD is a version of the Arduino Uno, but uses a surface mount version of the Atmega328P instead of the through-hole version. This version was made in response to a shortage in supply of the through-hole Atmega328P. The board is basically based on the ATmega328.

It has 14 digital input/output pins (of which 6 are often used as PWM outputs), 6 analog inputs, a 16 MHz quartz oscillator, a USB connection, an influence jack, an ICSP header, and a push button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to urge started.

The Uno differs from all preceding boards there in it doesn't use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

"Uno" means one in Italian and is known as to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 are going to be the reference versions of Arduino, moving forward. The Uno is that the latest during a series of USB Arduino boards, and therefore the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

fig.3.Arduino UNO

D. SOLAR PANEL

A thin-film solar cell is a second generation of solar cell that is made by depositing one or more thin layers, or thin films (TF) of photovoltaic material on a substrate, such as glass, plastic or metal.

A solar panel is a collection of photovoltaic cells so Which uses for the convert the light into electric energy using “photovoltaic effect”. So basically these photovoltaic cells consist of two layers of silicon film.one is negative film and another one is positive film.

Molecules always try to make a balance between the number of protons and electrons in each of their atoms to be neutral. Then they act as stable. When sunlight hits a solar panel then photon from the light remove electrons from the molecules in the upper layer of the solar panel which consists of siliconcell.

This electricity is been generated by these electronsin the solar panel. The positive silicon cell attracts the

negative electron and voltage difference are been formed. So current flow is been started.

III. LITERATURE REVIEW:

Design and Implementation of a Laboratory-Scale Single Axis Solar Tracking System:

The project demonstrates the planning and implementation A laboratory-scale single axis solar tracking system. By using the laboratory-scale system, the system becomes portable and convenient to be allocated at the acceptable workplace for solar tracking process. during this project, microcontroller was used as an integrated control unit and therefore the plant was actuated by the DC geared motor.

Here during this project, the implementation was done on single axis solar array where just one axis captures the solar rays. So, just one direction being capable of accepting rays for converting them into solar power respectively.

By this single axis approach just some number of rays being captured from sun through only that axis of rotation respectively.

Design and Development of Tilted Single Axis and Azimuth-Altitude Dual Axis Solar Tracking System:

This paper describes intimately about the planning, development and fabrication of two Prototype Solar Tracking Systems mounted with a single-axis and dual-axis solar tracking controllers.

The solar tracking system-Tilted Single Axis Tracker and Azimuth-Altitude Dual Axis Tracker are designed during this project. LDR had been used as sensing unit for the projects.

The negative feedback circuit for the systems was supported Atmega8 Microcontroller which was programmed to detect the daylight through the LDR sensors then actuate the DC geared motor using L293D motor driver to position the solar array.

A Review of Principle and Sun-Tracking Methods for Maximizing Solar Systems Output:

This paper proposes a completely unique design of a dual-axis solar tracking PV system which utilizes the feedback of the utilities provided by the means control theory alongside light dependent resistor (LDR) sensor and straightforward electronic circuits to supply robust system performance.

The proposed system uses a singular dual-axis AC motor and a stand-alone PV inverter to accomplish solar tracking.

IV. PROPOSED SYSTEM:

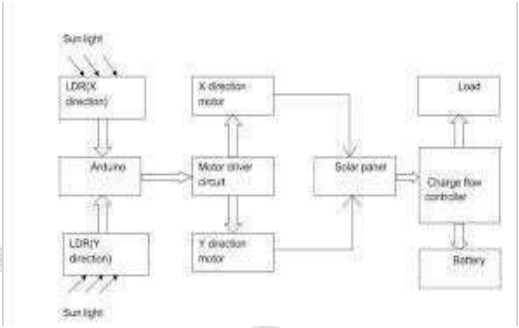

fig.4.Proposed system

As from the proposed system, sunlight comes form sun which then captured by the LDR which controlled by Arduino then next instruction provide to two attached the Solar panels in which one rotate in horizontal direction and one rotate in vertical to capture more and more rays so that form large amount of solar energy and last this solar panel transfer the energy to the controller which load into the battery for the further uses.

Arduino acts as main controller in this system which handles all the connected parts to it through means of jumper wires for controlling on it.

The backbone of system is an Arduino UNO which determines which motor should move during which direction to regulate the system in such how that the sun light falls orthogonally on the panel.

The solar array is initially placed flat on the mechanical structure. The panel captures the whole light incident thereon and converts it into electricity with the assistance of semiconductor layers. The Arduino is liable for all the logical calculations that are required for the system to perform needless to say.

A 7- or 9-Volt battery is employed to power the Arduino, which takes analog input from LDRs and provides power to the servomotors. Depending upon the position of the sun, the Arduino analyses the signals received from the LDRs. counting on which of the 2 LDRs has light incident thereon, its resistance and hence the magnitude of current flowing into the Arduino will vary.

V. CONCLUSION

This study was conducted so as to gain the performance of solar tracking system in tropical climates which equipped with MLD tracker, from the concept of solar tracking system, this is often compatible to harness more energy than a hard and fast solar array. we've tried to form an easy and low-cost tracking system.

Modification of an equivalent system are often used for giant application. Thus, this tracker system shows great potential to be utilized in larger device or applications, which demands more energy and will be useful in solar farm because it performed better at any weather.

VI. FUTURE SCOPE

The project work can be more improved with a few adjustments in the design and development. Real Time Clock (RTC) can be interfaced instead of sensors used here for seasonal tracking.

VII. REFERENCE

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