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Dual Axis Solar Tracking using LDR with Inverter

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Abstract - *Energy depletion and global warming lead to the de- velopment of methods for harnessing renewable energy resources. Solar energy is one of the most promising renewable energy resources. Sun trackers can substantially improve the electricity production of a photovoltaic (PV) system. This paper proposes an oval design of a dual-axis solar tracking PV system that utilizes the feedback control principle along with a four-quadrant light- dependent resistor(LDR) sensor and simple electronic circuits to provide robust system performance. The proposed system uses a unique dual-axis AC motor and a stand-alone PV inverter to accomplish solar tracking. The control implementation is a technical innovation that is a simple and effective design. Many scientists and researchers are working on developing various methods of calculating to collect the maximum solar radiation and to optimize the electric power extracted from the photovoltaic panel. We developed a solar tracking system for extracting the maximum power from a photovoltaic module.*

Key Words **- Dual axis solar Tracking, Light Dependent Resistor, Inverter, Photo voltaic panel, charge controller**

1. INTRODUCTION

As we all know, due to the continuously increasing pop- ulation there is more need for energy. The use of fossil fuel leads to more pollution in the environment and also excessive use of the resources leads to depletion of resources. In the era of energy crises, non-polluting and clean energy resources are renewable resources. Renewable resources like biomass, wind energy, solar energy, tidal energy, etc. The most promising source is solar energy. Solar energy can be converted into electricity using photovoltaic panels. In most cases, a solar panel is fixed to its position this restricts the amount of energy captured by the PV system. To capture the maximum amount of solar energy PV system must follow the sun throughout the day and which can be achieved by the solar tracking system. Solar tracking can be single-axis and dual-axis tracking. An inverter is an electric apparatus that changes direct current(DC) to alternating current (AC). Direct current is created by devices such as batteries and solar panels. When connected an inverter allows these devices to provide electric power for small household devices. The inverter does this through a complex process of electrical adjustment. From this process, AC electric power is produced. This form of electricity can be used to power an electric light. To increase the voltage, the current must be decreased. So an inverter will use a lot of current on the DC side when only a small amount is being used on the AC side. Here we used Sine wave inverters to produce good-quality AC power. They use pulse- width modulation (PWM) to produce a true sine wave, which makes them expensive.

1.1 Problem Statement

The problem here is the solar panel that is used only in fixed installation. Because of these problem, the power that can be generated is low.

This solar tracking system can detect a 180 degree of rotation. So the solar panel that can be generating power here is very high compare to the solar panel that can only stay in one direction.

The fixed solar panels do not aim directly to the sun due to the constant motion of earth. As the result the power produce by this device is not the maximum as it should produce.

2. Block Diagram

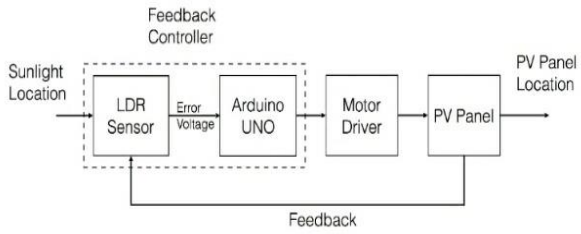


Fig 1. Block Diagram of Solar tracking system

Single axis solar tracker rotate on one axis moving back and forth in a single direction but in the proposed project we are going to use dual-axis tracker which continuously face the sun because they can move in two different directions. Two pair and LDR is used as sensors to track the suns exact position. One pair senses the position of the sun in vertical axis i.e. east and west side and other pair in the horizontal axis i.e . North to south. The information is then passed to the Arduino which determines the direction of the movement of the motors both in vertical and horizontal axis.

The power generated will be started in the battery/inverter and can be used for various purposes.

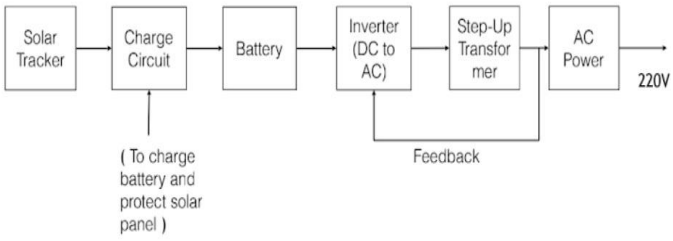
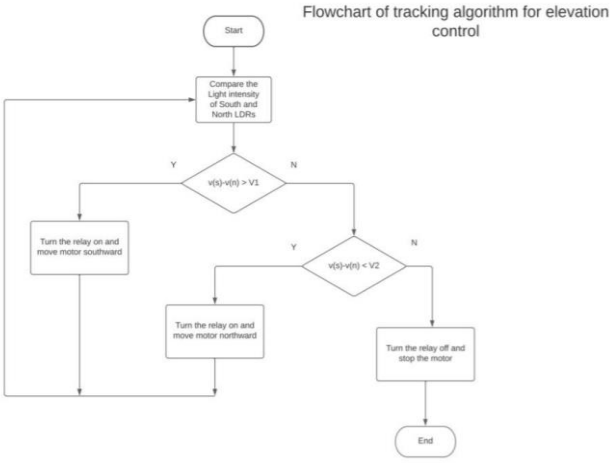


Fig 2. Block Diagram of Inverter

Inverter convert DC to AC. These power is used for electronic appliances .SG3524 is an integrated switching regulator circuit that has all essential circuitry required for making a switching regulator in single ended or push-pull mode. The built in circuitries inside the SG3524 include pulse width modulator, oscillator, voltage reference, error amplifier, overload protection circuit, output drivers etc.SG3524 forms the heart of this PWM inverter circuit which can correct its output voltage against the variations in the output load. In a non PWM inverter the change in output load directly affects the output voltage (when output load increases output voltage decreases and vice versa), but in a PWM inverter the output voltage remains constant over a range of output load. In these we used IRFP250N power MOSFET. It can be used as high power level devices. It can be provide the best combination of fast switching device design.



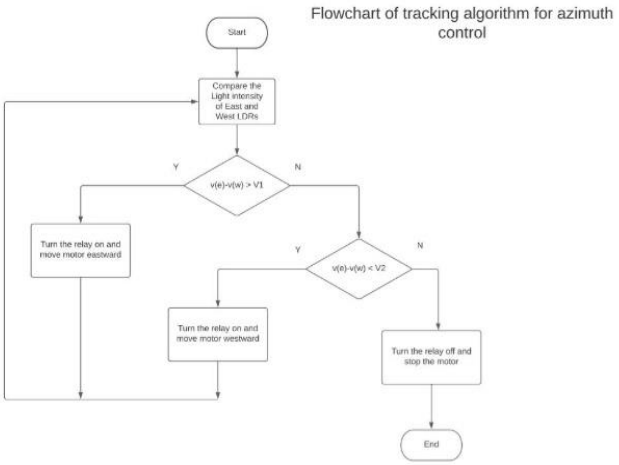


Fig 3. Flow of Working

Results

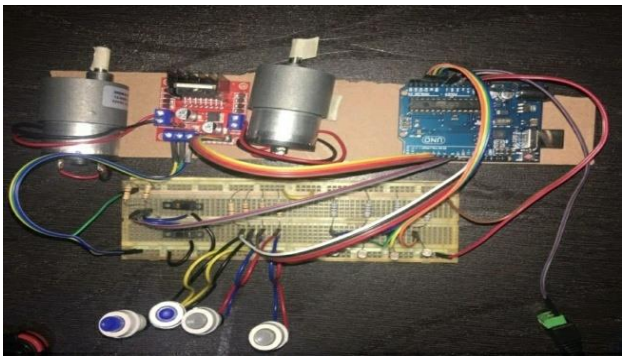


Fig 4. Breadboard Testing Solar

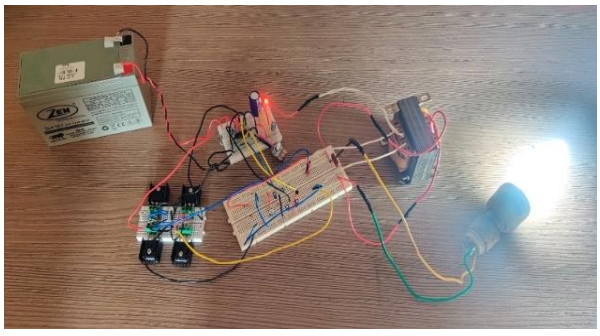


Fig 5. Breadboard Testing Inverter

Fig 6. Solar Tracking System

3. CONCLUSIONS

Here we have to presented a control implementation of a Sun tracker that employed a dual-axis motor to follow the Sun because they can move in two different directions. Here we have use the Arduino to determines the direction of the movement of the motor. The proposed system solar panel capture the more energy that what a fixed panel system collects and thus high efficiency is achieved through this tracker and these energy we can store the inverter or battery. Then these energy we can use various purposes. The developed system indicate that the increased the energy gain up to partly cloudy day. The proposed methodology is an innovation so far.

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