Dual Axis Solar Tracer with Weather Sensor

Prof. Suraj.S. Shinde[1], Ms. Pooja Tanaji Waghmode[2], Ms. Karishma Saybu Kare[3]
[1] *Assistant Professor, SMSMPITR AKLUJ (MS)*
[2,3] *B Tech Students, SMSMPITR AKLUJ (MS)*

***Abstract*—the world is now moving towards the renewable energy source due to various factors like pollution and cost of non-renewable energy sources. One of the major renewable energy sources is Sun. In this project Arduino based Dual-axis solar tracking system proposed in order to get maximum solar energy. The Arduino is used to give command to rotate the solar panel. Solar trackers are used to improve the power gain from solar energy. Solar power is changes due to the seasonal variation and tilting of earth which changes the position of the sun in the sky. In this regard dual axis solar tracking is practically implemented and performance is compared with fixed mount and single axis solar tracking system. Finally, project result clearly evident that proposed method gives better efficiency compared to fixed mount and single axis solar tracking system.**

***Index Terms*- The Arduino based dual axis solar tracking based solar panel is designed and successfully implemented to increase the efficiency of solar panel.**

I. INTRODUCTION

The expanding interest for vitality, the persistent diminishment in existing wellsprings of petroleum derivatives and the developing concern with respect to condition contamination, have pushed humanity to investigate new innovations to deliver electrical vitality utilizing perfect, inexhaustible sources, for example, sunlight-based vitality, wind vitality, and so on. Among the non-traditional, sustainable power sources, sun-based vitality manages incredible potential for change into electric power, ready to guarantee an essential piece of the electrical vitality needs of the planet.

Sunlight based vitality is free, for all intents and purposes limitless, and includes no contaminating residues or ozone harming substances emanations. Distinctive investigates evaluate that covering 0.16% of the arrive on earth with 10% proficient sun-oriented transformation frameworks would give 20TW of energy, about double the world's utilization rate of fossil vitality. As most of the vitality is in the immediate bar, expanding accumulation requires the sun to be unmistakable to the boards to the extent that this would be possible. A run of the mill sun powered board changes over just 30 to 40 percent of the episode sunlight-based illumination into electrical vitality.

II. LITERATURE SURVEY

The US Patent no. 0215199 A1 [2007] by Robert H. Dold describes a two- axis solar tracker capable of withstanding the extreme weather conditions. The solar tracker includes a solar array, a frame, a base, a pivot frame, and a first and second actuator. The solar array is mounted to the frame and captures sunlight. The base is pivotally connected to the frame and defines a pivot axis for elevation movement of the solar array. The pivot frame is also pivotally connected to the frame and defines a pivot axis for azimuthal movement of the solar array. The base is pivotally connected to the frame and defines a pivot axis for elevation movement of the solar array. The pivot frame is also pivotally connected to the frame and defines a pivot axis for azimuthal movement of the solar array. The first actuator controls elevation movement of the solar array and the second actuator controls azimuthal movement of the solar array. The solar tracker is pivo table between a raised position and a stowed position.

The US patent No. 0308091 [2008] by Ronald P Corioclaimsas an object of the his invention to mechanically link multiple solar trackers in a large array configuration so that they may operate in unison, driven by a single motor and tracker controller, whereby the mechanical linkage system is designed such that it must only be capable of withstanding the relatively low forces required to effect movement of the trackers without the requirement to resist larger wind forces acting on the array of trackers. Another object of his invention is to apply the drive principles to various solar single axis tracking geometries to maximize the economic performance for each solar

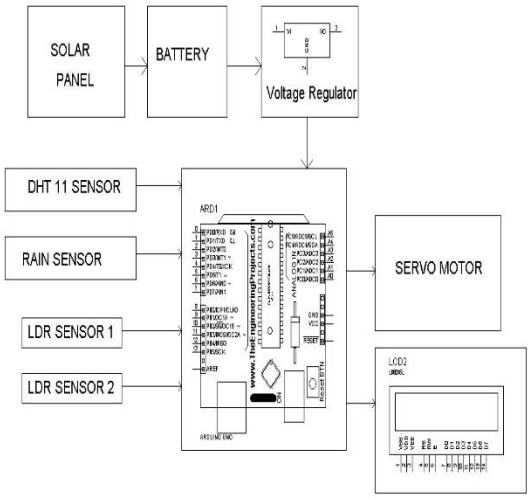
tracking application. Multiple gearboxes can be mechanically linked by drive shafts and driven by a single motor. The drive shafts may incorporate universal joints for uneven terrain or staggered configurations. Harmonic dampers can be affixed to the solar panels to decouple wind forces which allow the use of larger solar panels.

III. OBJECTIVE

In this project we will monitor the solar panel using rain senor.

- Propose dual axis solar tracker is cost effective
- Average power gain of solar panel with dual axis tracking system over normal stationary arrangement is up to 40-50%.
- Less power consumption by internal circuit and motors.
- Ability of tracking sunlight at any weather.
- Installation is easy and operates automatically.

IV. METHODOLOGY



BLOCK DIAGRAM

The methodology of a dual-axis solar tracker with a weather sensor involves a combination of hardware components, sensors, and control algorithms to track the sun's position and adjust the orientation of the solar panels accordingly. Here is an overview of how such a system typically works:

1. Solar Panels: The system consists of one or more solar panels mounted on a dual-axis tracking mechanism that allows them to move both horizontally (azimuth) and vertically (elevation).

2. Sun Tracking: The system uses sensors, such as light sensors or GPS modules, to determine the position of the sun in the sky. These sensors continuously monitor the sun's azimuth and elevation angles throughout the day.

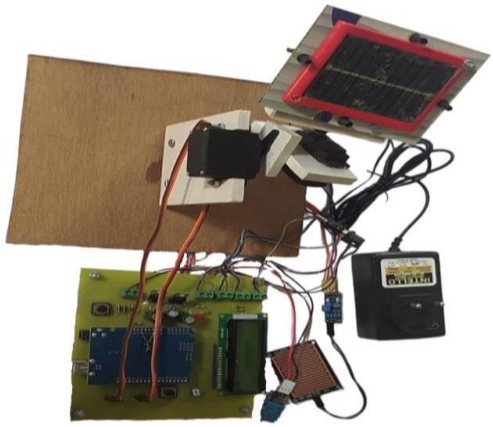
3. Control System: A microcontroller or a computer-based control system processes the data from the sensors and calculates the optimal position for the solar panels to maximize sunlight exposure

V. A. CIRCUIT DIAGRAM

The LM78XX/LM78XXA series of three-terminal positive regulators are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a Wide range of applications. Each type employs internal current limiting, thermal shutdown and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output Current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents. Meant 16000 A/m or 0.016 A/m. Figure labels should be legible, approximately 8-to-12-point type.

B. RESULT AND MODEL

A dual-axis solar tracker with a weather sensor is a sophisticated system designed to optimize the efficiency of solar panels by continuously adjusting their orientation to track the sun's position throughout the day. The dual-axis tracking system allows the solar panels to follow the sun's movement both horizontally (azimuth) and vertically (elevation), maximizing the amount of sunlight they receive.



C. CONCLUSION

The Arduino based dual axis solar tracking based solar panel is designed and successfully implemented to increase the efficiency of solar panel. The proposed dual axis solar tracker is more effective than the existing single axis solar tracker and fixed mount. The proposed solar tracker which automatically tracks the sun to grab maximum solar power with the help of Arduino board was effectively achieved. The implementation cost of Arduino board for tracking solar power is low and it is implementation is simple. Finally, experimental system clearly reveals that proposed system effectively tracks the sun in both good and bad weather conditions. During different time periods in a day compared with the existing system and efficiency of solar panel is effectively improved.

REFERANCE

[1] Bhavesh Pandey, Anita Agrawal "Automatic Sun Tracking System Using PSoC" International Journal of Innovative Research in Science, Engineering and Technology Vol. 1, Issue 1, November 2012.

[2] S. Abdallah and S. Nijmeh, "Two-Axis Sun Tracking with PLC Control," in Energy Conversion and Management, vol. 45, 2004.1931- 1939.

[3] Rani Molak , Vaishali Pawar, Omkar More, Atul Aradhye"Design Modification of Hybrid Solar Cooker" in International Journal of Advances in Management, Technology & Engineering Sciences Vol. III, issue 1(I), October 2013

[4] Jeya Ganesh N, Maniprakash.S, Chandrasekaran L., Srinivasan, S.M. "Design and Development of a Sun Tracking mechanism using the Direct SMA actuation"

[5] Kamala J , Alex Joseph "Solar Tracking for Maximum and Economic Energy Harvesting" Kamala J et.al / International Journal of Engineering and Technology (IJET)

[6] Kothari, D. P., and Nagrath, I. J. Modern Power System Analysis (3rd ed.). New Delhi: Tata McGraw-Hill Pub. Co., 2003.

[7] Solar Technologies | Photovoltaic Solar Panels | Thin Film Solar Panels Solar Thermal. (n.d.).Solar Panels, Photovoltaic Systems, Solar Solutions for Home, Business & Utility-Scale — SunPower. Retrieved August 29, 2013,http://us.sunpowercorp.com/solar-resources / howsolar -works/solar-technologies/.

[8] Hossein Mousazadeh a, Alireza Keyhani a,*, Arzhang Javadi b, Hossein Mobli a, Karen Abrinia c, Ahmad Sharifi b,"A review of principle and sun-tracking methods for maximizing solar systems output", a Department of Agricultural Machinery Engineering, University of Tehran, Iran