

Paper On Design And Fabrication Of Solar Based Inverter Using Microcontroller And Savonius

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Abstract - Increasing demand for energy in recent years has seen a rise in expansion of sub energy sources. Wind being one of the most abundant and easily available sources is an excellent substitute to conventional energy sources. Wind has been the fastest-growing power source worldwide on percentage basis. Vertical axis wind turbine have a feature that is specific attractive, they accept wind from any direction and do not need the complex head mechanism of conventional horizontal axis wind turbine.

Index Terms - Design, Fabrication, Analysis, Research, Renewable Energy

I. INTRODUCTION

Energy is very important for the development of any nation. There are many energy productions that depend on fossil fuels. The resources of the fossil fuels are not infinitely available, which means they are limited. Use of renewable resources for producing electricity is increasing because of the decrease in the non-renewable energy resources. The only way to increase the performance of a solar panel is to increase the intensity of light falling on it. So that we have to move the solar panel with respect to sun to increase its efficiency Savonius turbines and solar panels work together to boost the system's overall output. Review of the Savonius wind turbine's performance is included in this project. This turbine is used as alternative source for the system. The notion of photovoltaic effect could be traced back to Edmund Becquerel in 1839. He observed that when direct light strikes one of the electrodes of an electrolyte process, voltage was generated, and he called that the effect photovoltaic. Recently, the demand for Due to its substantial ability to convert solar energy into electricity, the popularity of PV panels has significantly expanded over the previous few decades. Electronic device run on AC power, however battery and some form of power generation produce a DC voltage so it is necessary to convert the voltage into a source that devices can use.

Because of its ease of usage and prominence in inverter applications, this technology has been the preferred option in power electronics. Regardless of the flow direction, a vertical axis turbine may capture wind energy. The solar PV cells capture the sun's light and transform it into electrical power. Future aspects will benefit from this hybrid system's integration. The main shaft of vertical axis wind turbines, or VAWTs, is positioned vertically. The fundamental benefit of this configuration is that the wind turbine does not have to face the wind. This is beneficial at locations with wind that is turbulent or has a highly variable direction. The main drawbacks of a VAWT generally create drag when rotating into the wind. It is difficult to mount the vertical-axis turbines on towers, meaning they are often installed nearer to the base on which they rest.

II. LITERATURE SURVEY

1. Rashmi, Shraddha, Soundarya “ Solar Based Inverter Using Microcontroller ”.

This paper has promising potentials, ranging from the long run economic to the important environmental benefits. This work is one of the few attempts and contributions where such projects could be implemented successfully, in the field of renewable energy. We observed that from in this paper design and implementation of microcontroller based solar inverter.

2. Firas B. Ismail1, Nizar F.O. A Muhsen2, Fazreen A. Fuzi1 “Design and fabrication of solar panel with sun position tracker”.

In this paper, the design, modelling, and experiment of a single-angle solar tracker are presented. The tracker depends on the sunlight. When sunlight intensity is very low, the PV panel cannot be moved by the tracking system. This happens because the tracking system depends on the sensors that depend on sunlight. It can clearly be determined from the results that the moveable PV panel by the tracker can improve the power efficiency significantly.

3. Ruchika Thukral, Gulshan Kumar, Ankit Gupta, MICROCONTROLLER BASED SOLAR POWER INVERTER”.

One of the series-connected Flexible Alternating Current Transmission System (FACTS) components, the Thyristor Controlled Series Compensator (TCSC), is examined in this research for its impacts; on the measured impedance at the relaying point for faults on a double circuit transmission line in the case of inter phase, phase to phase and three-phase faults are taken into account when operating the Metal Oxide Varistor (MOV). The line pre-fault loading, structural characteristics, and particularly the fault resistance, all have an impact on the measured impedance at the relaying point.

4.Kirlos Nabil Nagib, Asmaa Hamada Elfawal, Nada Emad Elsaid, “A Research Paper on Savonius Wind Turbine and Solar Panels Road Electric Station”.

In this paper, we discuss the working model of our project, which combines energy source with solar system and vertical axis wind turbine system, which is a good and efficient solution for power generation. Basically, this system involves the combination of two energy system, suppose anyone source fails to generate another source will keep generating the electricity and will give the continuous supply.

5.Sameer, Parshuram, Jayesh, Nitin “A Research Paper on Hybrid Photovoltaic, Savonius Type Power Generation System”.

This essay wraps up its examination of power quality enhancement. by employing wind deflectors and a vertical axis wind turbine (VAWT). Thus We Conclude that Renewable Energy can be utilized at its low running Cost & Maintenance. Using the data we received, we made recommendations for future studies on the potential rade wind turbines. Future tests can help determine the feasibility of homes, neighborhood, or cities that operate with wind turbines and the ability to run Renewable energy.

III FORMULATION

This study offers a solar tracking system built with a microcontroller and an LDR that actively tracks the sun and adjusts its position to maximise energy output. The LDR included within the solar panel detects sunlight and moves the panel accordingly. The ATmega328 microcontroller, a solar panel, light dependent resistors, and a servo motor comprise the system.



Fig.1: block diagram of the solar based inverter using microcontroller

The block diagram of the solar-based inverter employing a microcontroller is shown in the diagram in the fig. The servomotor is coupled to the Atmega328 microprocessor. The panels may be rotated 180 degrees with the aid of a servomotor, which functions as a rotor. Our solar panel produces 12V and can carry 100mA of current. These solar panels aid in the sunlight's absorption. According to Figure 2, solar panels are further connected to LDR. The resistors whose resistance values vary depending on the brightness of the light are known as light dependent resistors, or LDRs. As the amount of light shining on the LDR increases, the resistance value decreases. LDR will be most resistant in the dark. The LDRs are connected to four 10k resistors, which limit the flow of current when the solar panels are producing their maximum amount of electricity. Additionally, these resistors are connected to pins A0 and A1 on the microcontroller. As depicted in fig. 1, the solar panels' output is coupled with a 12V battery. An electric power source is a battery. It has one or more electrochemical cells with connections on the outside that can be used to run electrical appliances.

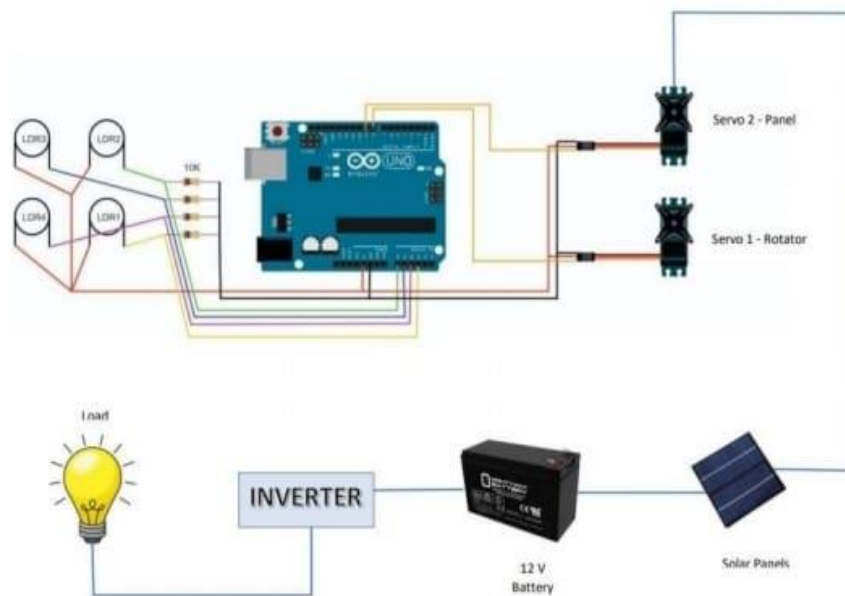


Fig. 2: block diagram of the Solar System

The block schematic of the microcontroller-based solar inverter. Servomotors are coupled to the Atmega328 microprocessor. The panels may be rotated with the assistance of servomotor is coupled to servomotor and rotates the panels 180 degrees. Solar panels we are utilising has a voltage of 12V. These solar panels aid in sunlight absorption. LDR is further connected to solar panels. LDRs, or light dependent resistors, are resistors whose resistance values vary with light intensity. As the amount of light shining on the LDR increases, the resistance value decreases. LDR will be most resistant in the dark.

IV PROBLEM DEFINITION

System under Study

The aim of the project is to design a model mechanism that allows a solar panel to follow a light rays. In order to do this there are a number of problems that need to be solved, mainly: Getting the solar panel to know the position of the sun. directing the panels in a certain way. evaluating the outcomes. By releasing hazardous gases into the atmosphere, conventional energy sources hurt the environment. As a result, it is our duty to save as much energy as we can to ensure that it is available for future generations and to save the environment from further harm. The effects of greenhouse gases and pollution are of a major concern and these have led to the new developments using the renewable energy resources such as solar, wind, and geothermal. Therefore, we are using the solar panels that uses solar energy which is the renewable energy source, with a motor for the rotation of the panels. why solar and wind energy? Improved corporate image, Available worldwide, Low operating cost, Increased over long-term electricity rates

V METHODOLOGY

1.Solar Panel

- A solar panel is a tool used to capture solar energy and transform it into electrical energy.
- Solar panel use sun light as a source of energy and generate direct current electricity.



Fig. 1 Solar panel

2.LDR

- Light Dependent resistors are electronic components that are used to detect light intensity.
- The resistance decreases with increase in incident light intensity.



Fig. 2 LDR

3. Microcontroller

- Microcontrollers was introduced in the electronics industry with the purpose of making our tasks easy.
- It is a very valuable addition in the electronics that consist of USB interface, 14 digit I/O pins, 6 analog pins and Atmega328 microcontroller.



Fig 3 Microcontroller

4. Servomoter

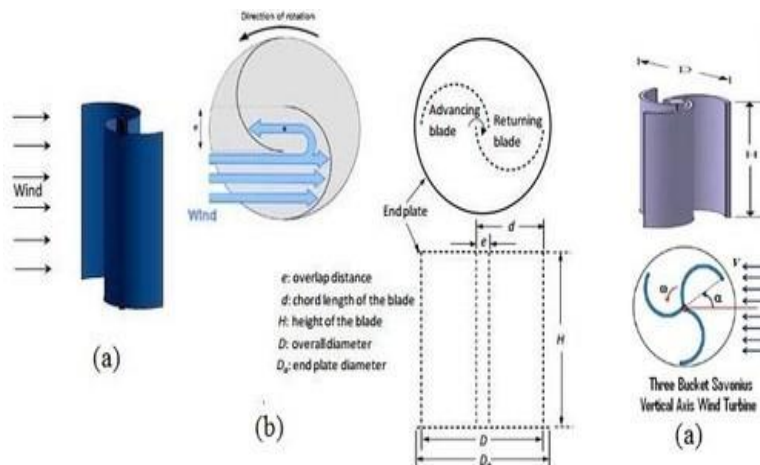
- An electromechanical device called a servo motor generates torque and velocity based on current and voltage.
- A servo motor functions as a component of a closed loop system, delivering torque and velocity as instructed by a servo controller and using a feedback mechanism to close the loop.
- A servo motor is a component of the three-part servo mechanism.
- A motor
- A feedback device
- Control electronics



Fig 4 Servomotor

5. Savonius Turbine Impeller

Savonius wind turbines are a particular kind of vertical-axis wind turbine that utilise wind energy to produce torque on a rotating shaft. The turbine is made up of several aerofoils that are either ground-based in aerial systems or typically but not always vertically placed on a revolving shaft.



VI OBJECTIVES

The objective of this design and fabrication of solar based inverter using microcontroller and savonius turbine are:-

- The world increasingly focuses on environmental concerns.
- To increase the efficiency of solar system during rainy season.
- The solar panel tracks the sun from east to west mechanically for maximum intensity of light.

Objective of this project is to provide alternative power solution for remote locations such as research areas and small villages. Also the system can be used as a temporary power solution for locations affected by disaster situation. The main objective of this project is to obtain energy from the wind and the sun. Therefore, this project is green A source of energy and has no impact on Earth's life. Also learn about wind energy and the different ways to convert it into useful energy, or learn about solar energy and convert it.

MODELING

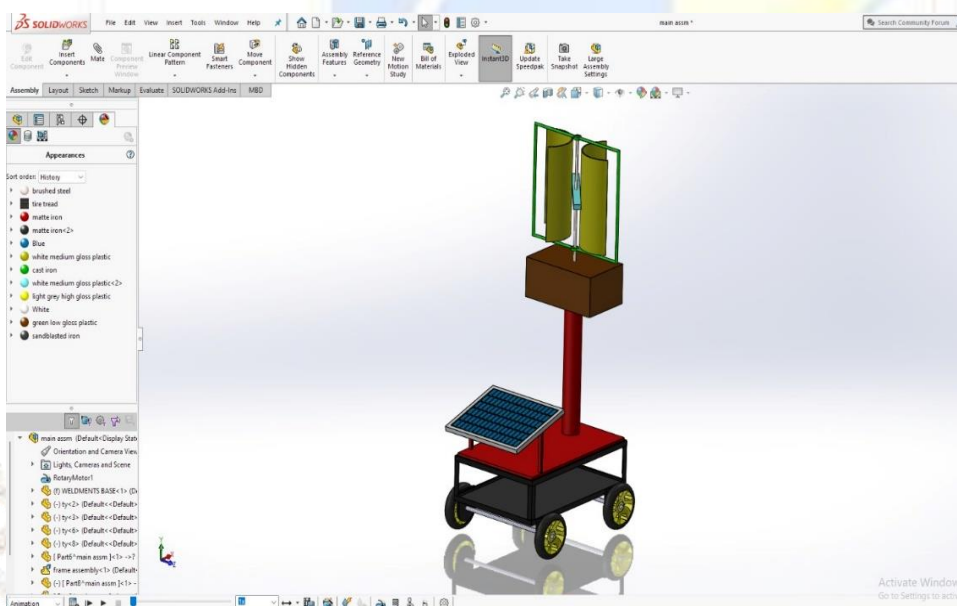


Fig. 3D Model of Setup

VII ANALYSIS

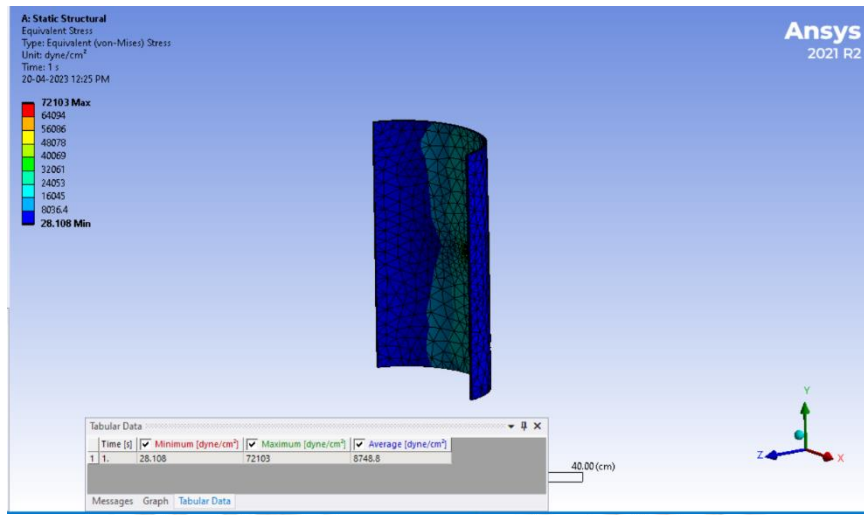


Fig. Analysis of blade on Equivalent Stress

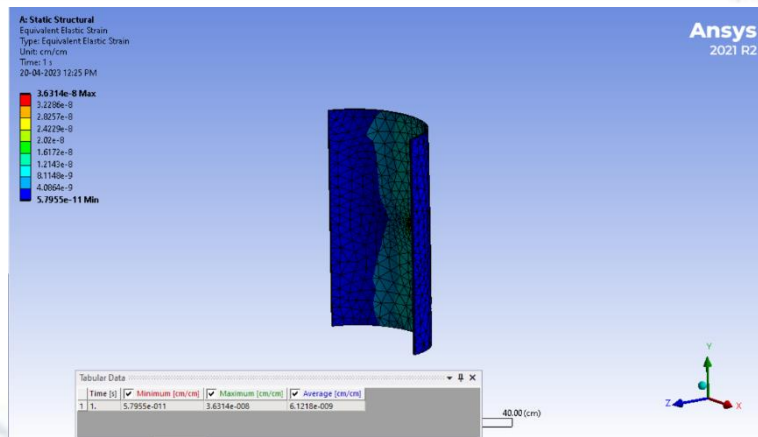


fig. Analysis of blade on Elastic Strain

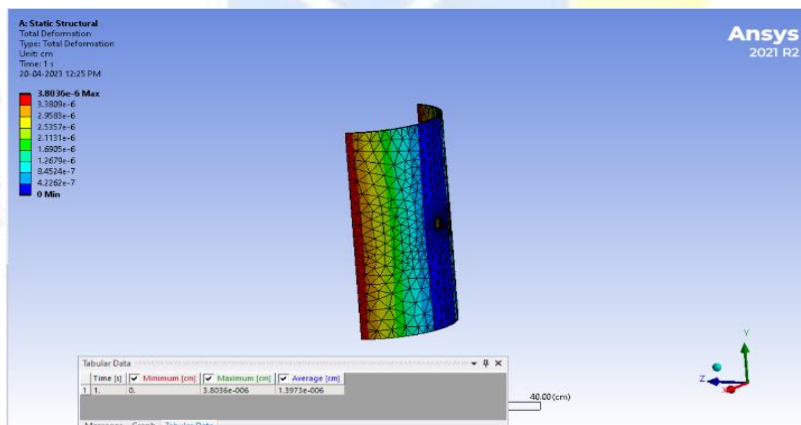


Fig. Analysis of blade on Total Deformation

VIII RESULTS AND DISCUSSION

Time	Position of solar panel	Power produce
9.00	45°	10W
11.00	15°	16W
2.00	-30°	19W
4.30	-67.5°	12W

IX CONCLUSION

This paper has promising potentials, ranging from the long run economic to the important environmental benefits. This work is one of the few attempts and contributions where such projects could be implemented successfully, in the field of renewable energy. With the increasing development in solar cell technologies and power electronics, such projects would have upgraded and should receive more attention and support. The usage of the SPT system and the implementation of solar concentrator technology may be primarily responsible for the rise in the amount of energy captured. Additionally, a review of the hybrid power system's improved power quality is covered. By using Vertical Axis Wind Turbine (VAWT) with wind deflectors. Thus We Conclude that Renewable Energy can be utilized at its low running Cost & Maintenance. Environmentally Friendly and Simpler To Install & Maintain. We were able to draw a number of significant conclusions and recommendations from our research that will aid in the development of individual vertical pivot wind turbines in the future. From our results, we were able to recommend new design aspects to enhance the system and efficiency. Inefficient wind speed was the huge impact getting the required power output, the minimum speed is required to have acceptable output power taking into consideration efficiency between theoretical and experimental results. Wind turbines are a start for society to lessen the damage done to the earth by not using energy sources that produce pollution.

X REFERANCES

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