

# Hybrid Horizontal Wind Mill and Solar with Monitoring System

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**Abstract**— In this paper, we design a Hybrid Horizontal Wind Mill and Solar system for power generation. It is designed to utilize two renewable energies wind and solar as hybrid system is more beneficial than a system only depends on one source. Thus hybrid system provides more stable and reliable power supply. Among two main wind turbines categories: horizontal and vertical turbine, we uses horizontal turbine in our system. The solar panel are placed on these propellers. The wind mill is capable to generate energy in day and night time while the solar PV cell can generate energy only during day time in sun light. A monitoring system is also integrated with this project, which monitor voltage and current output of the generation system and display it on 16x2 character LCD.

**Keywords:** Horizontal Wind Mill, Solar Panel, Renewable Energies, Power Generation, Power Monitoring

## I. INTRODUCTION

As both of sources wind and solar energy are not stable individually and also not stay same throughout. Thus by hybridizing the power generation of wind and solar energy source with batteries bank as the storage will provide wind or solar energy supplies a stable and constant power generation. By utilizing renewable energy sources such as hybrid solar wind turbine systems will provide benefit in increasing the reliability of the hybrid power generation system since it is depending on more than one electricity generation source. As our system doesn't use any fossil fuel to drive the system thus it is pollution free and it is also environmental friendly system. The solar energy also becomes one of the most promising alternatives for conventional energy sources and has been increasingly used to generate electric power. PV cells or photovoltaic is commonly known as solar cells, it able to convert the thermal energy from sunlight into direct current electricity. Solar energy offered major advantages which are better than other renewable energy such as no noise pollution during the power generation and insignificant periodic maintenance required. Meanwhile, wind energy is one of the least expensive renewable energy technologies currently. Moreover, the hybrid solar wind energy system is suitable to use in remote areas with inaccessible to utility grid.

Hence, in the project, hybrid solar and wind turbine system was introduced for the operation in day and night. In daylight hours, solar system can achieve the highest efficiency during the sunny day. Wind turbine able to function during day and night time without any restriction of climate with at least of wind. In order to achieve the highest efficiency for renewable energy systems in whole day, hybrid solar wind turbine system is one of optimum solution to generate the energy in anytime and all weather conditions

## II. AIM

This research has aim to design the model of hybrid solar wind turbine to produce current using multi generator in single setup and then investigate the feasibility of the Hybrid Horizontal Wind Mill with Solar, energy output and storage. This paper has potential challenges: dimension, cost and reliability. This paper discussed about the design procedure for horizontal wind turbine and placing solar panel on it. The output current is stored in battery. The Construction, working, parts of windmill, materials are studied in detailed in this paper. The vertical axis wind turbines are purely operates based on the drag force. But in horizontal axis wind turbines, lift and drag forces plays the roles to operate the wind turbines. The vertical axis wind turbines have less efficiency than horizontal axis wind turbines.

## III. OBJECTIVE

The objective of the proposed project is the study the design of hybrid system with wind and solar power generation. Nowadays need of power is increasing highly thus the need of alternate power source is very useful to generate the electrical power from natural resources in order to compensate the electric power demand. In order to find the optimal design of a hybrid power generation system, with the objective of maximizing power, while minimizing cost following works are done:

- To study the wind and solar energy utilization for getting maximum power.
- To combine these two renewable complementary sources in best way with cost minimization.
- To optimize the design of renewable energy component in hybrid energy system configuration, wind mill arrangement, solar panel, dynamo, rectifier, battery and connected to the Electricity Board supply.
- To study the wind turbine height and number of wind turbines.
- Organise the solar panel to achieving maximum power.
- To simulate the performance of the solar and horizontal wind turbine hybrid system in accordance with weather record.
- To examine a hybrid solar horizontal wind turbine system that capable to secure autonomy power supply for household in remote area and sufficient batteries as support of sustainable energy storage.
- To compare the power output of the hybrid system with the required electric load demand of domestic household.

#### IV. DESIGN OF HYBRID HORIZONTAL WIND MILL AND SOLAR

##### A. Electronic Design

###### 1) Major components required:

- Micro controller ATMEGA16
- 16x2 Character LCD Display
- Buzzer
- Battery
- Opto coupler
- Power Supply
- Solar Panel

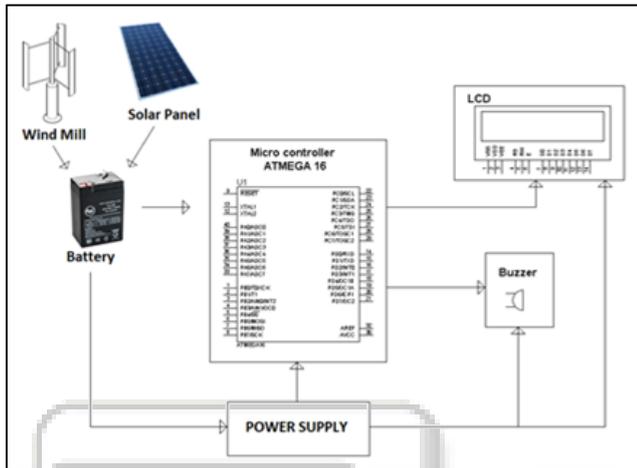


Fig. 1: Block Diagram of electronic circuit of Hybrid Horizontal Wind Mill and Solar

Figure 1 shows the block diagram of electronic design of Hybrid Horizontal Wind Mill and Solar. The solar panel and wind mill energy output has been saved in the battery connected to it which has been monitored through microcontroller circuit.

##### B. Mechanical Design

A Horizontal Wind turbine on vertical axis is used to make wind mill. Vertical axis has made by wooden rods. The blades of wind turbine have set horizontal on this axis. At each blades there will be a solar panel directed upward. There is metal disc on top of axis and all the solar panel has connected to this disc. Mechanical design Hybrid Horizontal Wind Mill and Solar is shown in figure 2.

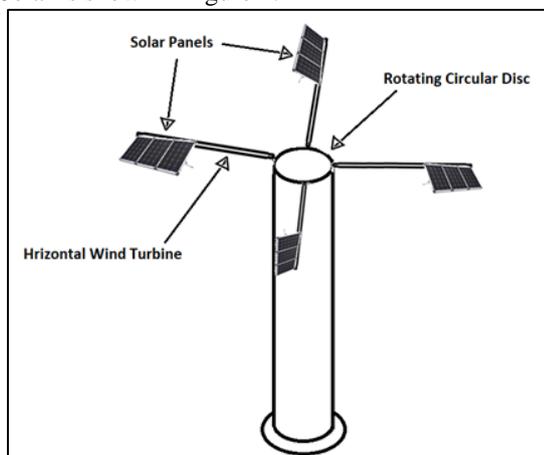


Fig. 2: Block Diagram of mechanical design of Hybrid Horizontal Wind Mill and Solar

#### V. MODELLING TASK AND SIGNIFICANCE

Proteus software is used for schematic and PCB designing of electronics circuit. For mechanical design has been done by different types of 3D software which includes 3D CAD software.

Our model provides power generation from the hybrid system from both wind turbines and solar arrays which meets the power demand of the load. The power generated by both sources is considered over a 12-month period under different weather conditions (e.g. higher solar radiation in summer, high wind in the winter). Our model minimizes the total cost, including maintenance costs and capital costs, and considers the interest rate over the project lifetime.

#### VI. CONCLUSION

In this paper, hybrid horizontal wind mill and solar system has been design for power generation. We have studied about vertical vs horizontal wind and their advantages and disadvantages. Charge controller is an important device for the battery life cycle. In the operation mode of charge controller, the life of battery will be reduced if overcharge occurs in the battery. In order to increase the battery life, the charge controller will block the electrical load continuously flowing in while the batteries are fully charged. In this duration we understand the importance of specific design of Hybrid horizontal wind turbine. Thus our main focus on mechanical design which involves the horizontal wind mill and direction and placing of solar panel at blade of wind mill.

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