

A Review Paper on Design and Development of EV Charging Station

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Abstract: The demand for electricity power is increasing day by day, which cannot be met with the satisfied level without non-renewable energy resources. Renewable energy sources such as wind, solar are universal and ecological. These renewable energy sources are best options to fulfill the world energy demand, but unpredictable due to natural conditions. The use of the hybrid solar and wind renewable energy system will be the best option for the utilization of these available resources.

If we combine these two it will help each other to overcome losses. Like when sunshine hour's solar PV systems will generate electricity and wind turbine systems will extract energy from wind sources. When wind conditions are not strong enough to produce power that time it's have backup to fulfill load demand & that will generate from the solar system

Compared to the traditional one-turbine wind-solar hybrid system, a new type of hybrid system—multi-turbine wind-solar hybrid system with eight 50 W turbines on a tower was designed and investigated. Experimental and simulated methods were used to study the power production of the hybrid systems, results show that eight-50 W turbine wind-solar hybrid systems have more power production than the traditional hybrid system, and the reliability of the new hybrid system also improved.

I. INTRODUCTION

Today in every country every task has been made faster with the help of machines, but the machines having high initial cost that demands huge investment & expenses. In India agri sector has facing shortage of agricultural labor, Due to shortage of labors farmer's demand cultivation machines. The agri sector has confronting genuine difficulties like shortage of rural work, in top working season as well as in typical time.

In regular strategy for establishing sugarcane sets are established physically in wrinkles, opened physically followed by conveying physically. This is then covered physically or by creature worked grower. In this manner, the cycle is a lot of tedious and work escalated. Numerous Tractor worked sugarcane grower have been created. In any case, the sugarcane grower which are at present accessible in the market are huge in size and worked with the assistance of weighty farm vehicle. Thus, they can't be worked in more modest grounds.

Sugarcane fundamentally developed for its juice from which sugar is made. The greater part of the world's sugarcane is filled in subtropical and tropical regions. A cultivator is a rural hardware utilized for sugarcane development with assistance of cultivator the dirt is hauled through directly or in revolving movement.

For the development of any country, energy plays an important role. It is a very essential part of the growth and economy of a country. Our primary source of generating energy is from coal, oil and natural gas. We all know that energy is needed for industrial, agriculture, commercial & domestic purposes. World's energy demand is increasing day by day. There are many sources of generating energy from coal, fossil fuels, oil & other gases. But all these sources are harmful to the environment so there are limitations of using these sources and they are limited.

Hybrid power is combinations between different technologies to produce power. Variability of renewable sources like solar and wind remains a major concern, despite a substantial decrease in the capital cost of their power conversion devices. One of the methods to improve the reliability of power is to combine more than one renewable power source and storage systems together, as per the local renewable potential, which is called Hybrid Renewable Energy System (HRES).

Most of us already know how a solar/wind power generating system works, but all these generating systems have drawbacks of some kind. Solar panels, for example, are expensive to set up, and peak output is not obtained during the night or cloudy days. Similarly, Wind turbines can't operate safely in high wind speeds, and low wind speeds produce little power.

So if both are combined into one hybrid power generating system the drawbacks can be avoided partially/completely, depending on the control units. As one or more drawbacks can be overcome by the other.

II. PROBLEM STATEMENT

Energy is recognized as a critical input parameter for national economic development. Modern day energy demands are still met largely from fossil fuels. In 1980, the global primary energy demand was only 7228 million tons of oil equivalent (mtoe) but this had increased to 11429 mtoe by 2005 (WEO 2007). Further increases can be expected, mostly in connection with increasing industrialization and demand in less developed countries, aggravated by gross inefficiencies in all countries.

Due to the increase in WFH and modernization overall, energy consumption has increased. The use of electric devices has seen rapid growth in the past few years.

III. OBJECTIVES

1. To develop a hybrid energy system consisting of Solar and Wind energy for electronic device charging.
2. To increase consumption of Renewable sources of energy.
3. The combination of wind and solar has the advantage that the two sources complement each other because the peak operating times for each system occur at different times of the day and year.

IV. SCOPE

1. This being a prototype, small scale project that can be implemented in Large scale.
2. We can install this set up beside roads, as there is an open unused space along the road where wind energy from the movement of vehicles can be utilized.
3. We can install this set up on terraces of buildings to supply continuous, clean energy for household purposes.
4. For commercial use, we can install this set up on unused land and produce energy.
5. As the world is moving towards Electric Vehicles, the need for charging stations is increasing which can be fulfilled by using this concept.

V. COMPONENTS OF MACHINE

1. Plywood box–

The supply voltage range is 12-48V with the extremity markers at the foundation of Plywood is an amazing combination of light, strength, and flexibility. For project we have used Hardwood type Plywood for making the box to keep all the instruments and to provide base for the project. We selected it as it is a good insulating material. We made a box of 70x50x20 cm .



Fig.01 : Plywood box

2. PVC Pipes –

PVC pipes are lightweight, low cost, and low maintenance. In it we used pipes of 2 diameters for making 3 branches of tree.

- 1. 25 inch for the branches of wind tree.
- 2. 5 inch diameter for the trunk of the tree.



Fig.02 : PVC Pipes

3. Solar Panel-

Polycrystalline solar cells are perfectly square. we have used Solar Panel of 20 Watt. We have mounted the Solar panel on the Pipe structure using the clamp. All the connections of solar panel are routed through the pipe to the box to solar charge controller.



Fig.03 : Solar Panel

4. Solar Charge Controller –

Solar Charge Controller is required to convert Normal Inverter battery into solar Solutions. It is used to charge battery using solar panels. In this project we used 12 Volt ,6 Ampere solar charge controller.

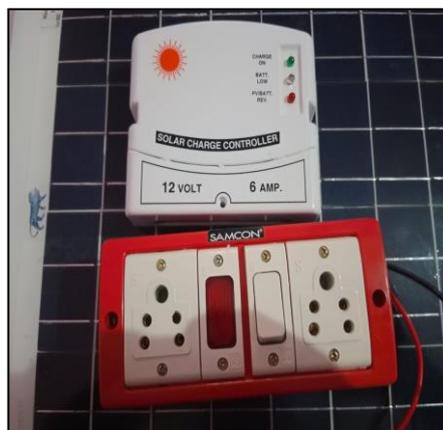


Fig.04 : Solar Charge Controller

5. Savonius Wind Turbine –

The Savonius turbine is one of the simplest turbines. Aerodynamically, it is a drag-type device, consisting of two or three scoops. Looking down on the rotor from above, a two-scoop machine might resemble the

letter "S" in cross section. Because of the curvature, the scoops experience less drag when moving against the wind than when moving with the wind. The differential drag causes the Savonius turbine to spin.



Fig.05 : Savonius Wind Turbine

6. Wind Turbine Charge Controller –

A wind charge controller is an electronic device that both ensures that your turbines don't over charge your batteries, as well as limit how fast speed the wind turbine blades are able to spin when the batteries are full or in high wind situations.



Fig.06 : Wind Turbine Charge Controller

7. Dynamometer (Generator) –

A dynamo uses commutators to produce direct current. It is self-excited, i.e. its field electromagnets are powered by the machine's own output. Other types of DC generators use a separate source of direct current to energize their field magnets.



Fig.07 : Dynamometer

8. Automatic Switch Controller

To ensure proper functioning of the system, there is an automatic switch selector to select most constant and higher voltage between the Solar panel and wind turbine input. We have designed the switch for making it user friendly.

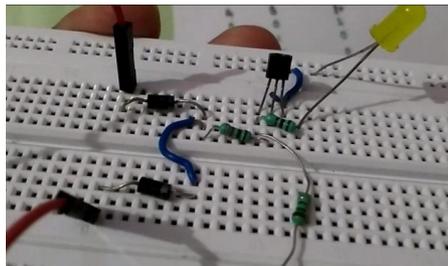


Fig.08 :Automatic Switch Controller

9. Battery –

A battery cell consists of two lead plates a positive plate covered with a paste of lead dioxide and a negative made of sponge lead, with an insulating material (separator) in between. The plates are enclosed in a plastic battery case and then submersed in an electrolyte consisting of water and sulfuric acid (see figure # 1). Each cell is capable of storing 2.1 volts



Fig.09 : Battery

VI. ADVANTAGES

1. Solar power is pollution-free and causes no greenhouse gases to be emitted after installation
2. Reduced dependence on foreign oil and fossil fuels

3. Renewable clean power that is available every day of the year.
4. Return on investment unlike paying for utility bills
5. Virtually no maintenance as solar panels last over 30 years
6. Safer than traditional electric current

VII. LITERATURE SURVEY

Review On Wind-Solar Hybrid Power System, Sumit Wagh, Dr. P.V. Walke [1] - The use of solar-wind hybrid renewable energy system is ever-increasing day by day and has shown incredible development in last few decades for electricity production all over the world. By using this development of new technologies and researches in the field of solar wind hybrid renewable energy system, a new difficulty arises, which become much more easily solved with new techniques. The presented review paper reported the different techniques and ideas about the HRES and its energy utilization.

Solar Power Operated Table For Charging Electronic Gadgets, Dinesh Keloth Kaithari, Amira Khamis Salim Al Ismaili, M. Achuthan [2] - The solar table is taking advantage from the sunlight. Solar table will collect all the energy from the sunlight to help the people to charge the electronic gadgets. This will be an eco-friendly solar panel table. The solar table also features rec connectivity charging for many electronic gadgets such as laptops and smartphones. The solar panel needs to pull power from the battery which works like source power backup at night. There is USB port to charge the phone.

Solar Roller - Solar Powered USB Charging Station, Aaron Bartfeld, Tanner Mjelde, Kaylan Naicker [3] - The obvious benefit of solar power over fossil fuels is that they are essentially 100% clean energy, producing zero emissions that directly contribute to climate change and environmental concerns. Extracting and using fossil fuels is expensive and harmful to the environment. Greenhouse gases, which are produced when fossil fuels are burned, lead to rising global temperatures and climate change. Climate change contributes to serious environmental and public health issues, including extreme weather events, rising sea levels, and ecosystem changes.

Feasibility analysis of a new tree-shaped wind turbine for urban application, Mostafa Rezaei, Mehdi Jahangiri, Mojtaba Qolipour [4] - The wind turbine system in this study is a novel, aesthetically pleasing, noiseless, pollution-free, potentially cost-effective, and high efficiency design called tree-shaped wind turbine (TSWT). Techno-economic evaluation is performed on eight urban areas in the province using the software HOMER. Multi-criteria decision making approaches are used to prioritize the areas in terms of the best location for installing such a new system.

Design of Aeroleaf Wind Turbine, Abdulkareem Abdullah A Alshammari, Mubarak Jazzaa N Alharbi, Abdulrahman Hassan D Alkaabi, Abdullah Ahmed Z Alghoneman [5] - From our research we were able to come up with many important conclusions and suggestions which will profit the future advancement of individual vertical pivot wind turbines. We could outline a VAWT framework that

enhanced power yield when contrasted with the past projects. From our results we were able to recommend new design aspects to improve the system and efficiency.

VIII. CONCLUSION

This chapter presents detailed work conducted on hybrid systems based on PV and Wind. The chapter systematically shows the different methodology used in the design, simulation, optimization and techno-economic aspects of PV-Wind Systems. Some design and application of the hybrid PV-Wind are discussed.

Hybrid renewable energy power system optimal design includes feasibility studies, model-based design, simulation and integration of several hybrid renewable energy resources, energy conditioner, and hybrid energy storage system and hybrid controller for automation to achieve power supply reliability. A hybrid renewable energy system (HRES) technology for reliable power supply has challenges in the design process. Thus, hybrid energy harvester, energy conditioner, energy storage and controller feasibilities, selection and unit sizing, and system configurations are necessary procedures to be carried out. Hybrid energy system components for power, reliability applications related to hybrid energy systems, power system has been reviewed above. In order to highlight the merits of the optimal design of hybrid energy systems with a promising sustainable solution for power supply reliability.

Hybrid renewable energy power systems can offer socio-economic return when enough power is available in rural areas as business activities are going to be established as the communities do some corn/wood mills, small scale industrial ventures to engage more youth in entrepreneurship.

IX. REFERENCES

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- 3) Solar Roller - Solar Powered USB Charging Station by Aaron Bartfeld Tanner Mjelde Kaylan Naicker June, 2017
- 4) www.google.com
- 5) <https://www.tandfonline.com/doi/pdf/10.1080/02604020903021776>
- 6) www.wikipedia.com



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