Design of Wind-Solar Hybrid Power System

Mahadev Bandelkar
Mechatronics Engineering
New Horizon Institute of Technology&Management
Thane, India

Sarvesh Sonawdekar
Mechatronics Engineering
New Horizon Institute of Technology&Management
Thane, India

Rushikesh Surve
Mechatronics Engineering
New Horizon Institute of Technology&Managment
Thane, India

Saloni Pawar
MechatronicsEngineering
New Horizon Institute of Technology&Management
Thane,India

Priyanka Gurao
MechatronicsEngineering
New Horizon Institute of Technology&Management
Thane, India

Abstract—*Theneed for electricity power is increasing day by day, which cannot be met with the satisfied level without non-renewable energy resource. Renewable energy sources such as wind, solar are worldwide and environmental friendly. These renewable energy sources are best options to fulfill the world energy demand. The use of the hybrid solar and wind renewable energy system like will be the best option for the utilization of these available resources. The objective is to study the various aspects of hybrid wind and solar system, the applications and different theories related to the development of hybrid power system and to generate electrical energy by using renewable and clean energy with minimum pollution. We have use hybrid system to overcome the drawbacks of renewable free standing generation system.This hybrid wind-solar power generating system is suitable for industries and alsofor domestic areas energy sources.*

I. INTRODUCTION

As we all know electricity is most needed facility in our day to day life. There are two ways by which we can generate electricity i.e either by conventional energy resources or by non-conventional energy resources. Electricity now a day's is generated by the conventional energy resources i.ecoal,diesel and nuclear etc. But these resources produces waste as ash in coal power plant, nuclear waste in nuclear power plant so as taking care of this wastage is very costly.And it also harms the nature as well as human being. Now a day's conventional energy resources are depleting. Therefore, non-conventional energy resources is the another way to generate electricity. These resources are reliable, pollution free and economical. They can be a good alternative for the conventional energy resources. There are many non-conventional energy resources such as geothermal, tidal, wind, solar etc. But as the tidal energy can be only implemented on sea shores and geothermal energy requires a very large step to extract heat from earth. Since, solar and wind are easily available they can be a good alternative resources for conventional energy resources. As solar has a drawback that it cannot produce electrical energy in rainy and cloudy season so as to overcome this drawback we will use two energy resources so that if any one of the source fails the other resource can keep generating electricity And in good whether condition we can use both the energy resources combined.There is a growing alertness that renewable energy such as solar system and Wind power have an important role to play in order to save the situation. Hybrid power system consist of a combination ofrenewable energy source such as wind generators, solar etc of charge batteries and provide power to meet the energy demand, considering the local geographical conditions and other details of the place of installation. They are also used in stand-alone applications and operate independently. The best application for these types of systems are in remote places, such as rural villages, in telecommunications etc. The importance of hybrid systems has grown as they appear to be the right solution for a clean and distributed energy production . This paper presents the wind-solar hybrid Power system that tackle the renewable energies in Sun and Wind to generate and supply electricity to a farm house, private houses, a small company, an educational institution or an apartment house depending on the need at the site where use.

II. HYBRID ENERGY SYSTEM

Hybrid energy system is the combination of two energy sources for giving power to the load. it can defined as “Energy system which is fabricated or designed to extract power by using two energy sources is called as the hybrid energy system.Hybrid systems are basically an integration of solar panels and wind turbine, the output of this combination is used to charge batteries, this stored energy can then be transmitted to local power stations. In this system wind turbine can be used to produce electricity when wind is available and solar energy panels are used when solar radiations are available. Power can be generated by both the sections at the same time also. The usage of batteries is to provide uninterrupted power supply.

Solar energy is that energy which is gets by the radiation of the sun. Solar energy is present on the earth continuously. Solar energy is freely available.it does not create any pollution.

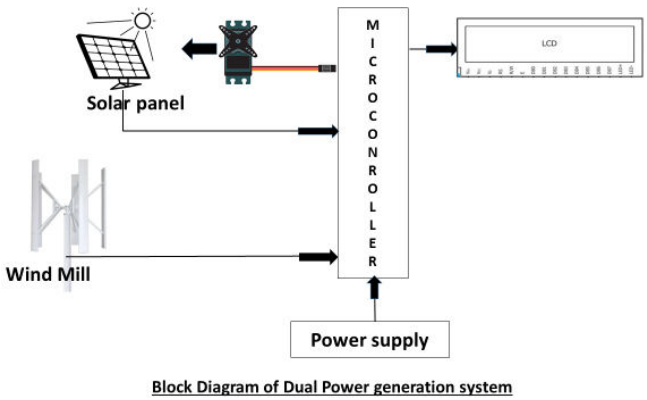
Wind energy is the energy which is pull out from wind. The wind energy needs less cost for generation of electricity. Wind energy is present almost 24 hours of the day. Generation of electricity from wind is depend upon the speed of wind flowing

The major disadvantages of using independent renewable energy resources are that unavailability of power for all time. For

overcoming this we have use combination of both. So that any one source of power fails other will take care of the generation. In this proposed system we can also use combination of both sources. Another way is that we can use any one source and keep another source as a stand by unit. This will leads to continuity of generation. This will make system dependable.

III. PROPOSE SYSTEM

A Windmill, which rotates when there is enough wind, generates electricity owing to magnetic coupling between the rotating and stationary coil. A horizontally rotating prototype of Windmill is being used in this project. Silicon based wafers which are cascaded together to form a Solar Panel is being used in this project to generate electricity. Dual Power Generation Solar + Windmill System harnesses both the Solar and Windmill i.e, Wind Turbine Generator to charge a 12V Battery. The System is based on microcontroller which smartly senses and charges the battery while displaying the voltage on the LCD. The Windmill, when in enough wind to drive it, generates power enough to charge a battery. Similarly, the Solar Panel which is mounted on a rotating panel which sets itself to maximum exposure of the daylight to generate energy enough to charge the battery. Since both of them simultaneously can work in favorable natural conditions, both can charge the battery at a faster pace than they would had individually. Thus this project is an example how natural resources can be efficiently harnessed to produce electricity at a faster pace and cheaper rate.



Block Diagram of Dual Power generation system

Fig 1. Block diagram of the system

IV. COMPONENTS

1) ATMEGA 8 MICROCONTROLLER
The ATMEG 8 microcontroller is one of the cheapest and provide many features in less number of pins. Due to its compact size it can be used in small boards for example- vending machine and coffee machine. Microcontroller needs a way to execute the program and perform through (CPU) just like computer. In hybrid power system microcontroller will carry the work of comparing input of both wind and solar power system and then it will operate in order to charge battery.
Operating voltage 4.7v to 5.5v
Program memory size is 8KB
Operating temperature -55°C to +125°C
CPU speed 16MIPS
It has 3 ports namely B, C and D
Number of total pins are 28 out of which 23 pins are I/O pins.

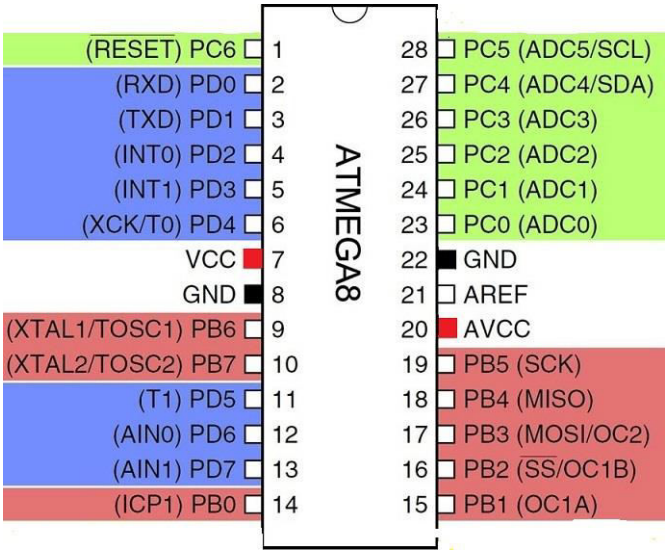


Fig 2. ATMEGA 8 MICROCONTROLLER

2) Servo Motor
TOWERPRO MG995 is a servomotor. It has metal gear which makes it reliable and robust. These motor has operating voltage between 4.8v-7v and are high speed with torque of 10kg/cm. Servo Motor rotates 90° in each direction making it 180° servo motor. TOWERPRO MG995 servomotors are commonly used in drones, security camera,roboticsand solar tracking and positioning.

3) Dynamo
Dynamo will generate enough power to charge battery, it as output of 6 to 20v and has capacity to generate current between 100 milliampere to 1.5 ampere.

4) Crystal Oscillator
Crystal oscillator is use for generating clock frequency or clock pulses for microcontroller, it will provide stable reference signal to microcontroller and also will provide basic timing for microcontroller.

5) Re-chargeable Battery
Re-chargeable lead acid battery is used due to its fast charging capability and it is also easily availiable. It is 12v ,1.5 ampere fully charged and ready to go battery. It has weight around 1kg.battery is used in order to store electricity that is produced from wind and solar energy.

6) LM7805 Voltage Regulator
LM7805 voltage regulator has input voltage range 7v-25v and can give the output voltage of 5v, also can give the output current upto 1.5A. voltage regulator maintains output voltage at constant value. Voltage source in a circuit may have fluctuations due to solar

irradiance and wind speed so voltage regulator will maintain output voltage at constant value. it has reverse bias projection circuitOutput Polarity-Reversal-Protection Circuit and high power dissipation capability.

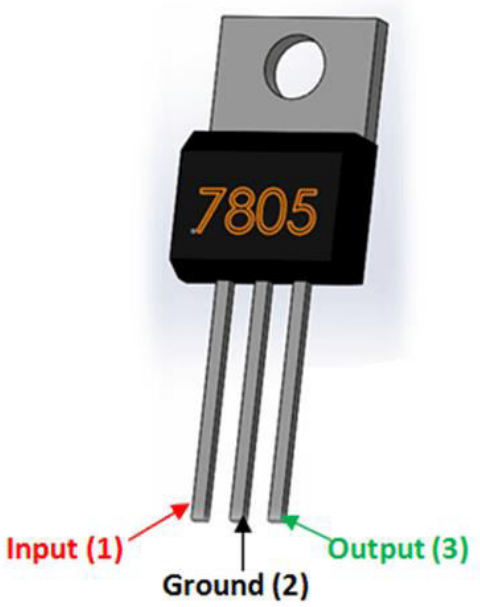


Fig 3- LM7805 VOLTAGE REGULATOR

7) Solar Panel

Solar Cell panels will convert the sun's energy into solar electricity. Solar Power has a huge potential to make a major impact on the electricity requirement in homes and many industries. Solar panel will help to charge battery during daytime. It will generate voltage 12v-18v and 12-15 watt power. It has weight around 1.5kg.

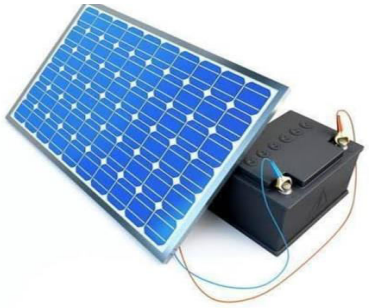


Fig 4- SOLAR PANEL

8) Wind Turbine

Wind energy is the energy which is taken out fromwind.The wind energy needs less cost for generation of electricity. The cost of Maintenance is also less for wind energy system. Wind energy is present almost 24 hours of the day.Generation of electricity from wind is depend upon the speed of wind flowing. The vertical blade turbine has been used and the material used for blade is M.S metal. It because it is strong and easily availiable.

Fig 5- WIND TURBINE MODEL

V. CONCLUSION

The use of solar and wind renewable energy system is ever-increasing day by day has shown good response and development in last some few decades for the electricity production almost all over the world by using this solar and wind devolopment of new technologies and researches on the field of solar and wind hybrid renewable energy system. A new difficulty arives which becomes easily solved with some new and easy techniques. The presented review paper reported the different techniques and ideas about the HREE and its energy utilization.

VI. FUTURE SCOPE

The paper first deals with the current scenario of the wind energy in India. Wind energy is available without any cost and it does not emit any greenhouse gases. This makes it a great source of energy production for any developing state. The field of wind energy has tremendous scope for innovation, translating to real world applications and tremendous economic opportunity. It is crucially important for India, as our economy continues to evolve, and we must ensure every Indian has access to opportunity, decent jobs and livelihood. For that we will need greater resources. Clean, sustainable, renewable-and equally important, domestic sources of energy are essential to

fulfill the potential of India in the coming years and it is certain that wind energy will play a major part in shaping India's future. Wind power has emerged as the biggest source of renewable energy in the world

VII. REFERENCES

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