Energy Management on Grid Connected Hybrid Renewable Energy Sources using ANFIS MPPT Controller

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Abstract - *Presently we are tackling the problem of Fuzzy controller for maximum power point tracking (MPPT) under varying insolation and shading conditions. Under these dynamic changes, most MPPT techniques fail to rapidly locate the global maximum power point and are stuck at global maxima leading therefore to inconsistent power generation and low system efficiency. In order to overcome this problem, we have proposed in this paper to apply the Adaptive Neural Fuzzy Interference System (ANFIS) algorithm in order to achieve global maximum power point tracking in record time. Using this method, the total output power of the solar system and wind system is maximized while minimizing the steady-state oscillations and the tracking time.*

Keywords: MPPT, Fuzzy controller, ANFIS, Global maximum power, Solar and Wind system.

1. INTRODUCTION

Now a day's electricity is most needed facility for human beings. All the conventional energy resources are depleting day by day. So, we have to shift from conventional to non-conventional energy resources. In this the combination of two energy resources takes place i.e. wind and solar energy. This process involves the sustainable energy resources without damaging the nature. We can give uninterrupted power by using hybrid energy system. Basically, this system involves the integration of two energy system that will give continuous power. Solar panels are used for converting solar energy and wind turbines are used for converting wind energy into electricity. This electrical power can be utilized for various purpose. Generation of electricity will be taking place at affordable cost. Our project will deal with the generation of electricity by using two sources at affordable cost without damaging the nature balance.

1.1 EXISTING SYSTEM

Previously MPPT algorithms have been designed using Fuzzy logic but it was able to deliver true maximum power under abrupt changes in sun shading of lower efficiency and lower values. Moreover, Fuzzy logic was not always accurate. In order to overcome this, we have opted for ANFIS Algorithm -an advanced version of Fuzzy logic for power generation.

1.2 Demerits of the Existing System

The Existing System possessed the following demerits-

- Fuzzy logic is not always accurate. The results perceived is as a guess, so it may not be widely trusted.

- Fuzzy logic control may not scale well to large or complex problems.

- Requires tuning of membership functions which is difficult to estimate.

- Fuzzy logic can be easily confused with probability theory and the terms used are interchangeable.

- Output power consisted of distortions.

2. PROPOSED SYSTEM

In this paper, an energy management strategy based on Artificial Neuro fuzzy MPPT control for micro grid system is executed and its core is based on the changes of the solar and wind system power generation, load power and battery. Using artificial neuro fuzzy theory to control the operation of the system in different modes, and the coordinated control of buck-boost converter, grid connected switch and battery is realized according to different operation modes. Finally, the simulation experiments show that the energy management strategy can control the stable operation of the micro grid system and realize the reasonable allocation of power and improve the utilization rate of power.
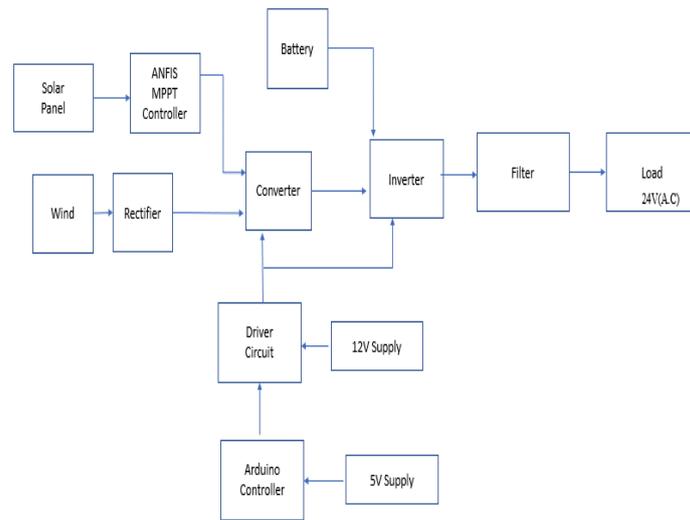
Fig 2.1: **Proposed Block Diagram**

The Proposed Block diagram of our project is depicted in Fig 2.1. Initially, the output from solar panel is given to the MPPT which tracks the maximum power point of sunlight and the output is D.C which is given to the converter. The output from wind source is A.C source which is given to the rectifier and given to the converter and a battery to connected to the inverter. Then from converter the output is given to the Inverter and the overall system is controlled using Arduino microcontroller and driver circuit. The output from inverter is given to the filter and then to the load. Finally, the electrical power can be used for residential purpose. The output that we get is 24V A.C that can be used for supply. If it is not connected to any load, then the output is about 60V.
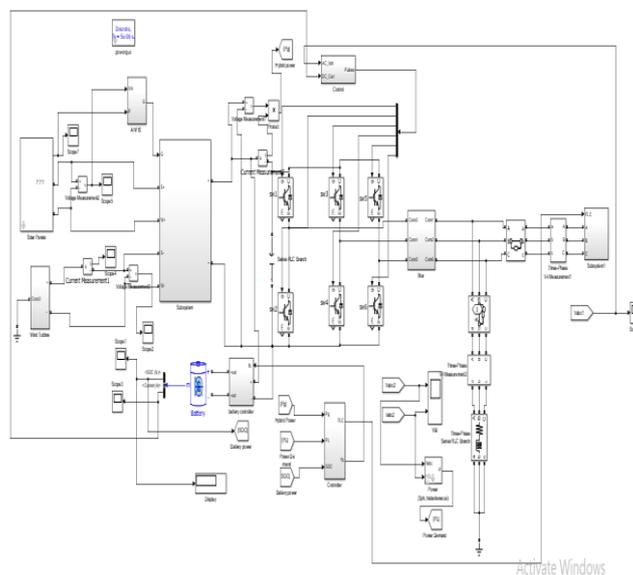
Fig 2.2: Simulation of the Proposed System

3. OUTPUT WAVEFORMS

The Results of the simulation is obtained as waveforms is given below
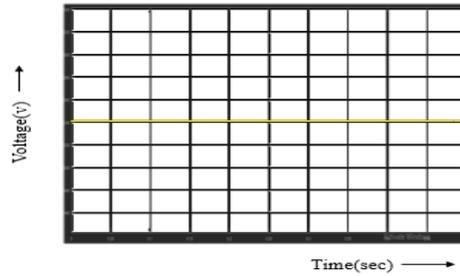
Fig 3.1: SOLAR INPUT
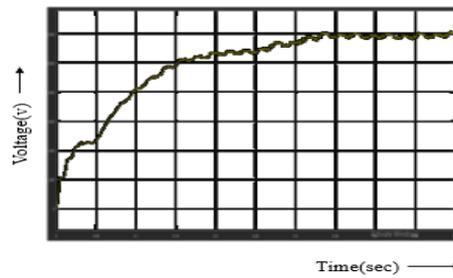
Fig 3.2: WIND INPUT
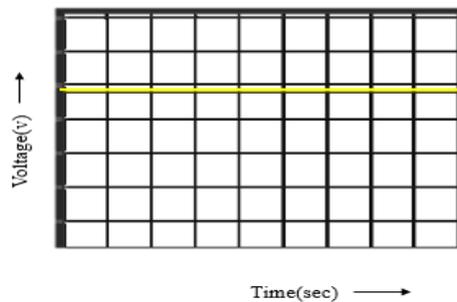
Fig 3.3: BUCK-BOOST CONVERTER OUTPUT

4. HARDWARE SETUP

Fig 4.1: Project setup

Our project consists of the following components

Compone	nts
Arduino	1
Solar Panel	1
dsPIC30F4011/4012	1
Inverter	1
DC Battery	1
wind energy source	1

5. CONCLUSION

Now a day's electricity is most needed facility for human beings. All the conventional energy resources are depleting day by day. So, we must shift from conventional to non-conventional energy resources. In order to deal with the present-day situation our project paves out to be sustainable and efficient without causing any damage to the environment. By using the method, the total output power of the solar system and wind system is maximized while minimizing the steady-state oscillations and the tracking time. Continuous power supply is achieved without any interruptions.

REFERENCES

[1] I. A. Adejumobi, S.G. Oyagbinrin, F. G. Akinboro & M.B. Olajide, "Hybrid Solar and Wind Power: An Essential for Information Communication Technology Infrastructure and people in rural communities", IJRRAS, Volume 9, Issue1, October 2011, pp 130-138.

[2] Kavita Sharma, Prateek Haksar "Designing of Hybrid Power Generation System using Wind Energy- Photovoltaic Solar Energy- Solar Energy with Nanoantenna" International Journal of Engineering Research and Applications (IJERA) Vol. 2, Issue 1,Jan-Feb 2012, pp.812-815 .

[3] Sandeep Kumar, Vijay Kumar Garg, "A Hybrid model of Solar-Wind Power Generation System", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE), Vol. 2, Issue 8, August 2013, pp. 4107-4016.