

Fuzzy Logic Controlled System for Utilization of Renewable Energy Sources of Industry and Home Appliances

Dr. A. R. Wadekar, Miss. Rutuja Bharat Lomate

Electronics and Telecommunication Engineering
Deogiri Institute of Engineering and Management Studies Aurangabad, India

Abstract- The per capita of power in India is insufficient compared to other developed countries in the world. Hence, the only way is the optimal utilization of available energy sources but the difference between production and consumption of electrical energy, during summer is very high, due to large utilization of cooling machines like Air conditioner, Air coolers in such case a software industry, like BPO call center or any office with large server and many systems need to have a 24 hours working Air conditioner. This leads to huge power consumption. Conservative measures need to be initiated and implement to decrease this gap to restrain this situation the concert of DSM has begun in power system planning and management. Therefore this paper included Fuzzy logic applied to Ac which results to calculate the actual hourly turn off period and reduction in energy consumption. By the optimal consumption of electrical power results increase saving by reducing the electricity bill and reduce the over load on live grid during peak hours and also calculate the cost of savings and playback period for the return of investment. In this paper, solar energy is used to run air conditioner. The cost of saving and playback period is calculated by considering only photo voltaic (PV) and photo voltaic with fuzzy controller, Results proved that usage of PV with fuzzy controller has better annual savings and lower pay back period compared with only considering PV.

Index Terms- DSM, MSEB, AC, RC, DC, LED

I. INTRODUCTION

Electrical energy is a necessary element for the improvement of a nation. To meet the emergent electrical energy demand, all types of power generating plants are being installed. Due to growing concern like global warming, volatility of oil price, vanishing fossil fuels and energy security the public interest have increased in clean and sustainable energy sources.

Renewable energy is a one of the best cost effective solution for new grid connected capacity in areas with good resources. Renewable energy technologies are getting economical, through technological change and through the benefits of mass production and market competition. As the cost of renewable power falls, the scope of economically practical applications increases.

As this trend continuous, utility companies may inevitably adopt a real time pricing strategy, where customers will pay more for electrical power they use during high demand periods and less during low demand periods.

As new model (direct load control) based on fuzzy logic techniques, which shows saving in electrical energy

consumption and playback period. Air conditioning system in residential buildings can be monitored and controlled by fuzzy system. For BMS and other systems, energy consumption of air conditioners at different set points can be managed. Some of the research scholars proposed neural inverse optimal controller for air conditioning system. For distribution system cost benefit analysis was carried out for different domestic loads.

This paper describes fuzzy logic controller based on DSM strategy, to increase the average turn off period of an air conditioner per day.

For the optimal consumption of electrical power results increase saving by reducing the electricity bill and reduce the over load on live grid during peak hours.

Calculate the cost of savings and payback period for the return of investment. In this paper, solar energy is used to run air conditioner. The cost of saving ad payback period is calculated by considering only PV and PV with fuzzy controller.

II. BLOCK DIAGRAM

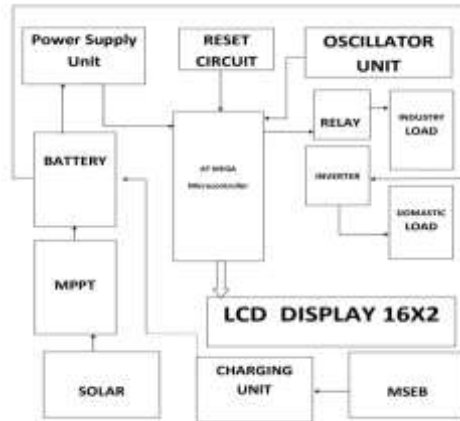


Fig 1. block diagram

III. CIRCUIT DIAGRAM

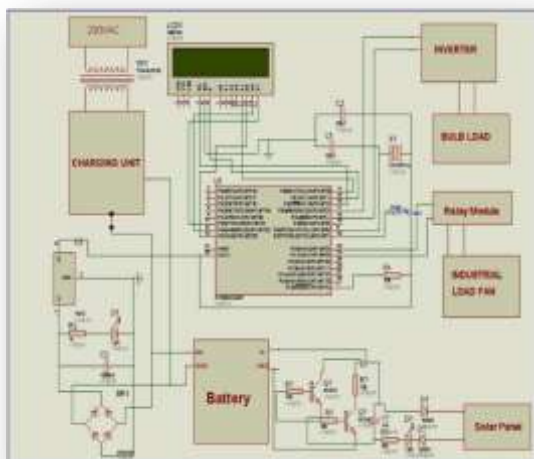


Fig 2. circuit diagram

IV. WORKING PRINCIPLES

In this project we have used two inputs or sources that one is the solar energy source and another one is the MSEB energy source. We have taken 230V supply voltage from the MSEB and given to the primary of the transformer and secondary of the transformer is 12V and given to the ac to dc circuit. Here we have used 12W battery with 5AH current. Battery is used for the storage purpose. When the sun intensity is very high then the battery is charged. By using the MPPT charge controller or snubber circuit. Snubber circuit having different parts but the diode is used to pass the voltage from the solar to

battery and it prevents the reverse operation is known as snubber circuit. In the snubber circuit we have used two transistor (BC547) circuit that is darling tone pair. one Zener diode is used to voltage regulation purpose. and all the register having 10k ohm and 10k ohm register is given to base of the transistor and another two register is given to the base of the another transistor.

Firstly solar voltage is given to the Zener diode and passes to the capacitor and capacitor fully charged. Basically darling tone pair configuration is used for current amplification and it's having 100 times gain. It is also called as beta gain. But we have used auto changeover circuit before the battery storage. Auto changeover means initial supply of solar is off condition so, it is directly given to battery. If in case battery is not charged and we required to take supply from MSEB and charge the battery. Then solar part is disconnected and supply taken from MSEB. Output of the auto changeover circuit to the battery.

Auto changeover is used small part of the fuzzy logic. Fuzzy logic means we run the different circuit without programming. Microcontroller having coding. Driver unit drive the BL DC unit or fan. it is also called as AC or cooling system, duct AC, ducting.

If supply taken from battery and it is given to the switch .when switch is pressed then domestic load is on. After the switch we have used the inverter circuit. In that first two register and capacitor is known as RC oscillator. According to RC oscillator calculation driver IC generate 58MHZ frequency. Primary side of step up transformer 12V square wave is used. But we want to step up this 12V and convert into 230V and load is ON

Advantages

- Uninterrupted energy save 24*7.
- No human required for change over.
- Battery charging features available on solar as well as MSEB.
- Industrial load switching does not required circuit breakers.
- Due to microcontroller easy to find fault.

Disadvantages

- Initial costing so high.
- Solar panel required periodic maintenance.
- Need to check inverter efficiency and battery required maintenance.

Applications

- Used in all types of call center.
- Used in hospitals and emergency areas.
- Also suitable for airport.

- Server rooms required this type of system.

Future Scope

- Upcoming green energy will be utilized.
- 100% replacement of traditional type energy generation.
- Capable to expand.
- Industry as well as domestic areas also covered in future.
- Also capable to cover individual buildings, row houses and home.

Results

- If the sun intensity is more, then system running on solar and it's saved voltage is 0.68V and current is 0.08A.
- In the rainy season sun intensity is less, then system running on battery.
- If the solar and battery is not working then the system automatically switched to the MSEB grid due to auto changeover circuit and running on it.

V. CONCLUSION

we have seen the large difference between production and consumption of electrical energy, during the summer season we required more power because of air cooling, fan, air conditioner etc. these paper leads to more power consumption. So in this paper solar energy, battery and MSEB supply is used to run the air conditioner. As compare to other power supply solar use is very helpful for us. Because it is very cheap and reliable.

And our other load is domestic load and it is totally depends on the demand side management (DSM), for the domestic load we have used the 7W bulb. In our project inverter circuit is used to run the domestic load. In the day sun intensity is more and solar is on working condition it's mean system running on solar and the battery is charged. If the user having the domestic load, then the battery voltage given to the inverter circuit and the bulb is on condition because of the battery and inverter circuit. Inverter circuit works as a step up transformer.

REFERENCES

1. P. RaviBabu, "DSM techniques and Fuzzy logic application to Air conditioner - a case study" Proceedings of 8th WSEAS International Conference on power system, Santander, Cantabria, Spain, September 23-25, 2008.
2. H. Salehfar, and P.J, "Fuzzy Logic -Based Direct Load Control of Residential Electric Water Heater and Air Conditioners Recognizing Customer Preferences in a Deregulated Environment", IEEE, 1999.
3. N.M. Ijumba and J. Rose, "Electrical Energy Audit and Load Management for Low income consumers".IEEE 1996.
4. Zhao Li" A novel neural network aided fuzzy logic controller for a variable speed (VS) direct expansion (DX) air conditioning (A/C) system". Science direct-applied thermal engineering, pp: 9-23, December 2014.
5. Sohair F. Rezeki" Management of air-conditioning systems in residential buildings by using fuzzy logic". Science direct-applied thermal engineering, pp: 91-98, April 2015.
6. Nan Wang" Energy consumption of air conditioners at different temperature set points". Science direct-Energy and buildings, pp: 412-418, June 2013.
7. Flavio Muñoz" Real-Time Neural Inverse Optimal Control For Indoor Air Temperature And Humidity In A Direct Expansion (Dx) Air Conditioning (A/C) System". International Journal of Refrigeration, April 2017.
8. M NageswaraRao and R SrinivasaRao,"A Microcontroller Based Renewable Energy Source Allocation of Different Domestic Loads in Distribution System - A Cost Benefit Analysis" RITS ICAEM-2012: RITS-International Conference on Advancements in Engineering & Management 28 & 29 February 2012.