IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
Volume 9, PP 09-11

Solar Hybrid Inverter System Using PIC18 Microcontroller

Abhiraj Tawde[1], Rashmi Chaugule[2], Rohit Yadav[3], Pankaj Sabne[4], Rishabh Sawant[5]

[1(]*Dept. Of Electrical Engg, Atharva College Of Engineering, Mumbai University, India)*
[2(]*Dept. Of Electrical Engg, Atharva College Of Engineering, Mumbai University, India)*
[3(]*Dept. Of Electrical Engg, Atharva College Of Engineering, Mumbai University, India)*
[4(]*Dept. Of Electrical Engg, Atharva College Of Engineering, Mumbai University, India)*
[5(]*Dept. Of Electrical Engg, Atharva College Of Engineering, Mumbai University, India)*

Abstract: *It has become clear that the basic architecture of today's electricity grid, which revolves around the idea of a top down radial transmission system dependent on unidirectional electrical energy flows from large centralized power plants, is obsolete, then aggregation platforms, such as the hybrid inverter, will become vital. Solar Hybrid Inverter are modern, small-scale versions of the centralized electricity system, having specific local aims, such as reliability, carbon emission reduction, diversification of energy sources, cost reduction ,and improved efficiency established by the community of users being the beneficiaries. This paper presents an intelligent solar hybrid inverter system that is installable in small or mostly rural localities and consists of sources like grid power, solar power etc. By efficient use of sources the overall cost for the users can be reduced. Smart switching is done at the user end as per the requirements so as to restrict the user for overloading. Local power generation and storage allow portions of the grid and critical facilities to operate independent of the larger grid, Smart switches and sensors automatically fix and even anticipate power disturbances, unlike today's system where switches have to be reset manually in case of any outage.*

Keywords: *Battery Charging, Hybrid System, UPS, Switching, Converters.*

I. Introduction

An intelligent solar hybrid inverter is a new generation of dedicated U.P.S. (Uninterruptible Power Supply) which can use both electrical as well as solar energy to charge the system storage battery which can be used to generate electricity in the absence of either or both of energy sources. Usually electricity from solar panels is generated only during the day, with a peak production around midday. This electricity is fluctuating and not synchronized with the electric consumption of the household. To overcome this gap between what is produced and what is required during the evening when there is no solar electricity production, it is necessary to store energy for later use and manage energy storage and consumption in an intelligent way. The rural areas most of the time face the problem of complete blackout hence the solar hybrid inverter can be used as back up source for supply of electricity. There are many benefits of using hybrid inverter as it causes no pollution, use of renewable sources such as solar energy for generation of electricity also avoids use of non-renewable sources of energy like coal , diesel. Hence hybrid inverter proves efficient and reliable for uninterruptible power supply of electricity.

II. Material And Methods

The working methodology of this system mainly revolves around the use of renewable energy for generating electricity and supply electrical power for loads which can vary from home, industrial, hospitals , schools, etc.

Solar energy: In this project solar energy is used as a renewable source for generation of electricity. Besides being used for heating and cooling, solar energy can be directly converted to electricity. Most of our tools are designed to be driven by electricity, so if you can create electricity through solar power, you can run almost anything with solar power.

Hybrid inverter: solar inverters can only convert DC power generated from the array into usable AC power. Hybrid inverters go a step further and work with batteries to store excess power as well. This type of system solves issues related to unreliable grid structures. The hybrid inverter works in both the conditions i.e. off-grid and on- grid. The figure given below represents the block diagram of the solar hybrid inverter system.

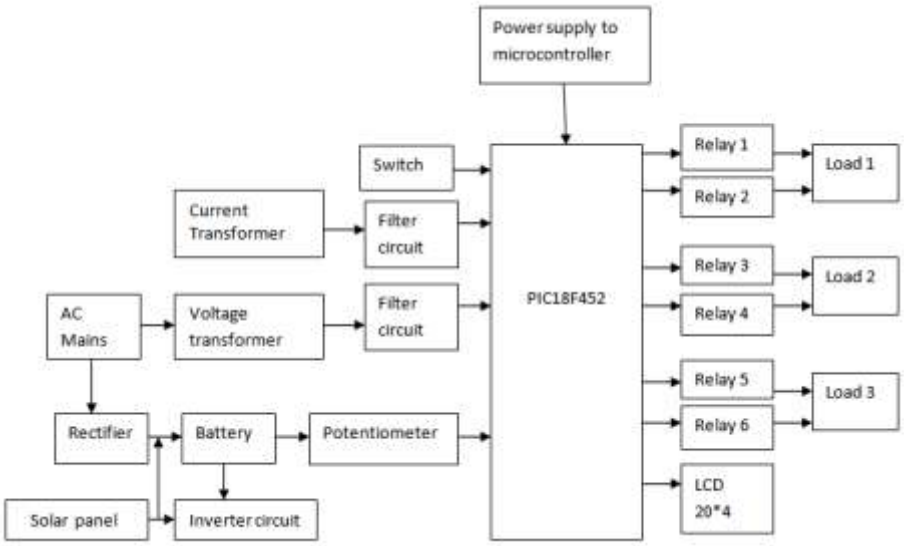

Fig.1: Block diagram of solar hybrid inverter

III. Flow Of Working

The above given block diagram shows the flow of working of the solar hybrid inverter system.

Microcontroller: The microcontroller in this system senses the type of supply whether AC or DC through which the respective relays are connected. So when the switching is carried out the respective relays are working which are connected to loads .In this system Relay 1, Relay 3 and Relay 5 are connected through AC mains supply and Relay 2, Relay 4 and Relay 6 are connected to DC supply.

Load: The loads in this system are classified as high, medium and low. All the three loads are connected by two relays. The load which needs to be given regular supply should be based on the priority.

Battery bank: The batteries in use for solar systems are the storage batteries, otherwise deep cycle motive type. Various storage devices are available for use in photovoltaic power system, The batteries are meant to provide backups and when the radiance are low especially in the night hours and cloudy weather. The battery to be used:

(a) Must be able to withstand several charge and discharge cycle
(b) Must be low self-discharge rate.
(c) Must be able to operate with the specified limits

Selector switch: Selection of the load is done using selector switch.

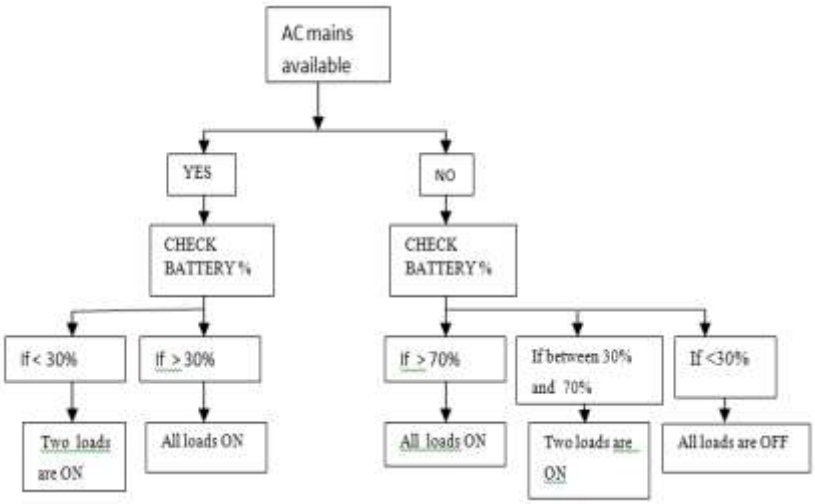

Fig.2: Flow of working of the hybrid system

The above figure shows the flow of working when the priority is given to high load to be kept on all the time with uninterruptable power supply.

Relays: Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit.

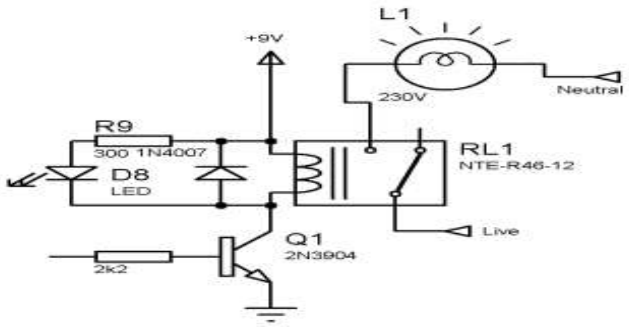

Fig.3: Relay Unidirectional AC load circuit

Current Transformer: A current transformer is a type of transformer that is used to measure alternating current (AC).It produces a current in its secondary which is proportional to the current in its primary.

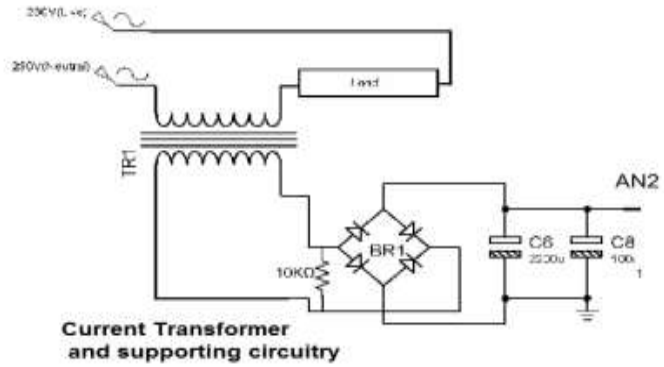

Fig.4: Current Transformer circuit

IV. Conclusion

In this paper the present work of solar Hybrid energy system was explained. A portion of energy requirement for private house, small company or an apartment house depending on the need at the site where used can be supplied with the electricity generated from the solar power. It reduces the dependence on one single source and has increased the reliability. Hence the efficiency and the reliability of the system is more than the individual mode of generation.

References

[1]. CHEN HONG, LENG Hua , TANG Haiguo, ZHU Jiran, GONG Hanyang, Research On Model Management Method For Micro-Grid.
[2]. Oo Abdul Rosyid, Comparative Performance Testing Of Solar Panels For Smart City Micro-Grids.
[3]. Saiket Barua, H. Shahadat, B. Sujoy, H. J. Mashrukh, H.Ziaul, Demand Side Load Management System For End User In Micro Grid.
[4]. Kannan Thirugnanam, See Kim Kerk, Chau Yuen, Nian Liu, Meng Zhang Energy Management For Renewable Micro Grid In Reducing Diesel Generators Usage.
[5]. M.Wissener,The Smart Grid-A Successful Of Series. Applied Energy., Vol88, P.2509-2518, 2011
[6]. EPRI, Distributed Energy Resources: Current Landscape And A Roadmap For The Future, 2004.
[7]. EPRI, Renewable Energy Technical Assessment Guide, 2005.
[8]. Driesen J, And Katiraci F, "Design For Distributed Energy Resources".
[9]. IEC 61970-301:2013 Energy Management System Application Program Interface (EMS-API): Part 552 CIM XML Model Exchange Format, 2013
[10]. IEC 61970-301:2013 Energy Management System Application Program Interface (EMS-API):Part301 Common Information Model (CIM) Base, 2013